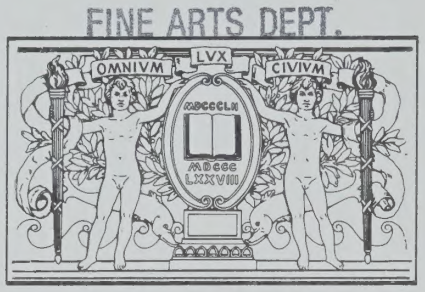
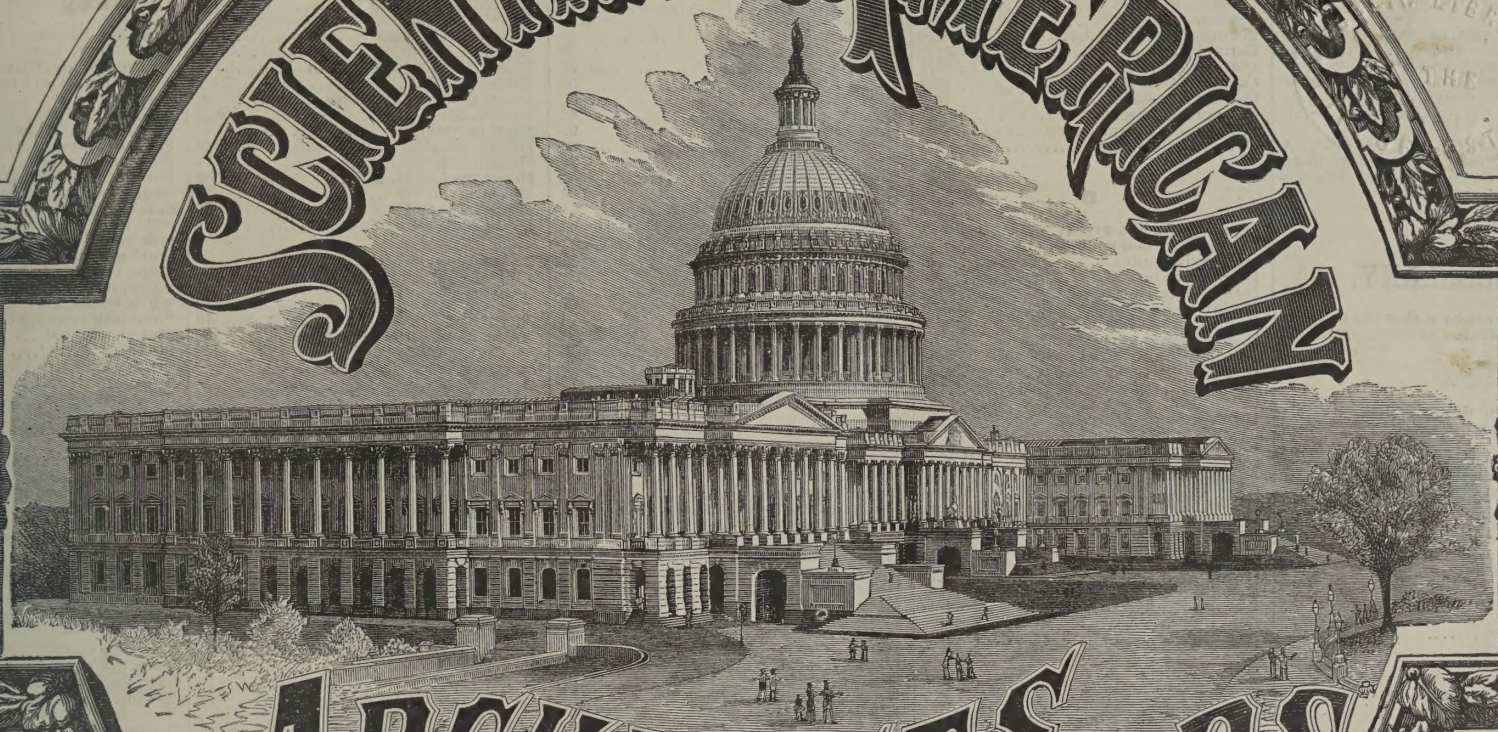


SCIENTIFIC AMERICAN



ARCHITECTS AND BUILDERS EDITION.

Vol. IV.

JULY—DECEMBER,

1887.

MUNN & CO., PUBLISHERS,

No. 361 Broadway, New York.

INDEX.

VOLUME IV.—JULY–DECEMBER, 1887.

Articles Marked * are Illustrated.

COLORED PLATES.

I. A Cottage for $2,500. A residence in Kansas City. With large plate of details drawn to a scale. July.

II. A $4,000 cottage. A $1,400 double house. With plate of details drawn to a scale. August.

III. A Southern residence of moderate cost. A $1,200 cottage. With plate of details drawn to a scale. September.

IV. A residence of moderate cost. A country store and flat. With plate of details drawn to a scale. October.

V. City frame houses of moderate cost. A $2,500 dwelling. With plate of details drawn to a scale. November.

VI. A dwelling of moderate cost. A suburban residence. With large plate of details drawn to a scale. December.

MISCELLANY.

Figures preceded by a *star* (*) refer to illustrated articles.

SCIENTIFIC AMERICAN

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THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

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CONTENTS

Of the July number of the ARCHITECTS AND BUILDERS EDITION of SCIENTIFIC AMERICAN.

(Illustrated articles are marked with an asterisk.)

CONCERNING AGENTS.

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A DWELLING AT MONTCLAIR, N. J.

SPECIFICATIONS AND DRAWINGS.

The specifications and drawings are intended to cooperate, so that any work shown on the drawings and not mentioned in the specifications, or *vice versa*, is to be executed the same as if mentioned in the specifications and set forth in the drawings, to the true intent and meaning of the said drawings and specifications, without any extra charge whatsoever. The drawings taken in connection with this specification are intended to provide for the completion of the entire carpenter work, mason work, painting, plumbing, tinning, etc, and everything mentioned in this specification.

DESCRIPTION OF WORK.

All work throughout to be done in good, substantial and workmanlike manner, and to the satisfaction of the owner or his agent.

Timber.—All the timber to be good, sound hemlock, free from all bad defects, and as well seasoned as the market will afford.

Sills, 3″ × 8″; posts, 4″ × 6″; interties, plates, etc., 4″ × 4″; first and second tier of beams, 2″ × 10″; partition plates, 4″ × 4″; studding, 3″ × 4″; main rafters, 2″ × 8″; ridge pieces, 2″ × 10″; piazza sills and bearing timbers, 3″ × 8″; piazza beams, 2″ × 8″; piazza rafters, 2″ × 8″; collar beams, 2″ × 10″ × 24″ on centers; beams under tank to be made extra strong.

Lumber.—All the lumber throughout to be of well seasoned clear white pine, except where otherwise specified.

Framing.—Sills to be halved at angles and corner and well spiked. Size floor beams on sill and spike well thereto; size second story beams on ties; post to have tenon on top to receive plate. Tenon all the studs on top and neatly fit on bottom. Double all beams for trimmers and headers; double all beams running parallel with partitions. Double all window and door studs, including heads. First and second story beams, 16″ on centers, all rafters 24″ on centers, porch floor beams 20″ on centers. Fit main rafters neatly to plate, mortise and tenon all headers and trimmers.

Siding.—Cover the entire vertical sides, except where otherwise shown, with clear 6″ Michigan strips, not less than ⅞ lap, and nailed with 6d. nails, not more than 6″ apart, and set nails for putty.

Cornice.—Form cornice as shown on the plans, with fascia and moulding as shown, all as per details

Gutters.—Form gutters on roof, line, and give proper cant to run water.

Shingling.—Shingle where shown on plans with 18″ pine shingles, laid not more than 5″ to the weather. The starting course to be rounded on the bottom; all the rest plain and straight.

Corner and Angle Boards.—All the corner boards to be 1¼″ × 5″; angle boards, 1¼″ × 3½″.

Water Table.—Run water table around the entire house, except where piazza comes; first member, 1¼ × 4″, with wide member at bottom, all as per details.

Window Frames.—Make window frames in usual way, for double hung sash pulley stiles, 1¼; hanging stiles, 1¼ × 5; 2″ main sill; 1¼″ rabbeted sub sill, stops and parting strips complete.

Door Frames.—Make door frames in the regular way; rabbeted jambs 1¼ thick; outside casings, 1¼ × 5″; 2″ main sill.

Piazza, Cornice, Rails, Columns, etc.—Piazza plates to be 6′ × 8′, made of 1¼ lumber, and a timber inserted for strength; form cornice same as main house cornice and as per details. Form the piazza rail as shown on the plans and as per details. Rail to be 4 × 3, moulded; bottom to be 3 × 4, moulded; columns to be 6 × 6, turned in center and square at each end; balusters for piazza, 1¼″ × 2″, beaded edges.

Piazza and Stoop Floors, etc.—Lay the piazza and stoop floors with 3″ × 1″ narrow pine flooring, tongued and grooved and laid in white lead joints; this flooring to be clear and perfectly dry, all to be blind nailed and all head joints smoothed off; all to have proper cant from house to nosing finish; fascias, 9″ wide.

Stoops, Lattice, Cellar Door, etc.—Put down all necessary steps to all stoops as shown on the plans; 1¼″ strings; 1¼″ treads; and ⅞ risers. Treads 11″ wide. Coil up on sides of stoop strings. All steps to have nosing and cove finish. The front stoop to have bulkheads.

Brackets.—Furnish all brackets as shown.

Overhanging Floors.—All the overhanging floors to be deafened with rough hemlock boards, cut in between the beams at least 3″ down, and this space filled in with mortar.

Sashes, Blinds, etc.—All the sashes for first and second and loft stories to be 1½ thick; made of clear, soft pine, and number of lights as shown. Outside rolling blinds on first and second stories.

First Story Floors.—The first story floors will be laid with sound, white pine flooring. All to be blind nailed to each and every beam. All heading joints smoothed off. Second story floor to be same as first. Attic to be 9½″ wide flooring.

Bridging Beams, Partitions, etc.—Bridge all the floor beams once between their bearings with 2 × 2 bridging, nailed at each end. Bridge all partitions once in their height with 2 × 4, straight and well nailed.

Tin Work.—Line all the gutters and valleys with the best I. C. charcoal tin, 20″ wide, well nailed and soldered. Tin all flats. Furnish and put in all necessary flashing of every description.

Leaders.—Furnish and put up all necessary 3 leaders to convey water to ground where directed.

Slating.—Slate the whole entire roof with 16 × 8 black slate, not less than 3″ lap.

Doors.—For sizes and number see plans. The front door will be 2″ thick, and made as shown on the elevation, with heavy raised moulding on the outside and flush moulding on the inside to match other doors. Folding doors 2″ thick, four paneled, and flush moulding. All other room doors first and second stories to be 1½″ thick, closet doors to be 1¼″. 1½″ doors double faced, 1¼″ single faced, all to be four paneled and flush moulded. Those for rooms, 1½″; closets, 1¼″. All these doors to be blind tenoned and perfectly dry and clear for wood filling for door to have head light over.

Jambs and Saddles.—All the door jambs throughout to be 1¼″ rabbeted. All doors that swing, to have four and a half inch hard wood saddles. All hearths to have hard wood hearth borders. All doors, where needed, to have rubber tipped stops.

Bases and Wainscoting.—All the rooms and halls in the first and second stories, except bath room, to have 7½ base with moulding on top; closets to have 5″ beaded base. Wainscot bath room 2′ above the fittings all around; this wainscot to be of yellow pine.

Closets, Pantries, etc.—The butler's pantry will be fitted as marked on the plans. Five shelves high; shelves 14″ wide and to be supported with cleats all around. Shelves supported on turned columns. All the second story closets to have two shelves, each supported on cleats all around and hanging strips underneath with hooks. All these shelves to have beaded edges. Also build and shelve dressers as shown on first story plan.

Stairs.—Build main stairs from first to third story of clear, dry pine, 1½″ treads, ⅞″ risers, 1¼″ strings, both strings to be housed out. All the treads and risers to be wedged with glue. The front string to be moulded as will be shown on details. Treads to have nosing and cove finish. The balustrade on these stairs will be yellow pine rail 2½ × 3½. Intermediate newels 4 × 4, with head and drops, chamfered, reeded, etc.; rail to be moulded. Balusters 2 × 2, square and turned, etc.; all as shown. All these stairs will be well supported and furred and ready for lathing. Stairs from second story to loft to be plain box stairs. Build cellar stairs as shown, 2 × 10 spruce strings, 1¼″ spruce treads, no risers.

Architraves.—The trimmings for principal part of first story will be 4½ casings reeded and moulded as per detail, with wall moulding to miter with base moulding. Second story, kitchen, pantry, etc., will have 4½″ casings, moulded as per details. Closet to have 4″ plain casings. Window casings to match those of door, with stop beads complete. All the interior woodwork throughout, including doors and stairs, to be white pine.

Stools, etc.—All windows to have neat moulded stools with apron.

Corner Beads.—Furnish and put on corner beads to all exposed plaster corners.

Grounds, Furring, and Cutting.—Furnish and set grounds to all doors for the mason to finish his work. Do all furring of every kind. Do all necessary cutting for plumbers, gas fitters, and other trades.

Sash Weights and Cords.—All double hung sash to have cast weights and Italian sash cords.

Glass, Glazing, etc.—All the glass on first and second stories to have second quality, single thick French sheet glass. All this glass will be puttied in and well tinned, and the glass washed off immediately after the putty is put in. This glass must be protected from injury by the mason.

Hardware.—All the doors on the principal part of the first story to be hung on 4×4 lacquered plain butts, second story and kitchen to have 3½ × 3½ imitation bronze butts. Front doors to have three butts each. Principal part of first story to have jet and bronze knobs and bronze drop escutcheons. Second story to have lava knobs and roses and drop escutcheons. All rooms throughout to have brass faced mortise locks, city made. All closets to have reversed rim locks. Front doors to have heavy front door lock, night latch attachments and bronze knob outside; brass flush bolt top and bottom; the principal part of first story to have the Daisy sash lock with bronze tip, others plain tip. Furnish all necessary drawer pulls, cellar bolts and hooks, bolts, etc; all necessary hardware for bath room and pantries, etc.; in fact, all necessary to complete the job.

Mantels.—Contractor will set the mantels, but owner will furnish same.

Fit up bath room in ash, inclose wash bowl, set tub, furnish top to tub, fit up water closet with riser, seat, and lid, all complete. Furnish and set two wash tubs with covers, tubs made out of 1½ perfectly clear and dry lumber. Set up on turned legs.

Ceil the piazza with narrow ceiling, beaded, part on rake and part on level.

Furnish and put all necessary pipe boards for the plumber to screw his pipes to.

Contractor will set wood mantels.

Privy.—Build privy where directed, of wide ceiling boards, planed on two sides. Small cornice shingle roof, panel door. Small sash and holes with covers complete.

MASON'S SPECIFICATION.

Excavation.—Excavate for all piers and foundations 2′ 6″ deep. All earth and rubbish to be removed where directed. All water that may accumulate during the excavation, from any cause whatsoever, will be removed at once and the premises kept dry.

Brickwork.—The cellar walls to be of hard burnt brick, 8″ thick from bottom to top, started on a solid concrete footing course, laid up straight and level, headers every seventh course, to be good strong cement mortar, and to the height as shown on the plans, which is 7′ in the clear. The joints to be struck. Leave holes in wall where directed for soil, gas and water pipes. All angles and corners to be perfectly plumb and the wall level on top. The brickwork to run to top of beams

Brick Piers.—Build brick piers where shown on the plans, of good hard burnt brick, size and number as shown on plans. All piers to be excavated for at least 2′ 6″ deep, and filled in with small stone and well hammered down to a solid bed. Cement the whole entire cellar bottom 3″ thick with screened gravel and Rosendale cement, 3 parts gravel, 1 part cement, left perfectly smooth on top.

Chimneys, Flues, etc.—Build chimneys as shown on plans, of good hard burnt brick, the joints of all flues struck smooth and capped as shown. The fireplaces in dining room, parlor, hall, and library room will be built of selected brick, arched on top, and as will be directed; the hearth of same to be tile, to cost twenty-five cents per square foot, without the cost of laying.

Cesspool.—Build and excavate cesspool where directed, 60′ from house, 8′ × 8′ in the clear, laid up with brick and domed over on top, covered with flat stone.

Drain Pipe.—Run 4″ drain tile from inside of cellar wall to cesspool. Build privy vault 4′ deep, walled up with brick, 8″ smaller each way than privy frame, laid up dry. This vault to project 2′ in clear of rear of privy.

Cistern.—Build cistern in rear of house, 12′ in diameter by 13′ deep, laid up with brick laid on flat in cement mortar, domed over on top, and have manhole covered with flat stone or iron cover. Cement the entire inside with strong cement and put flat stone at bottom for water to strike against.

Tiling.—Run a line of 4″ drain tile from leaders to cisterns, with the joints well cemented.

Plastering.—The first and second stories, including all closets and soffits of attic stairs, to be lathed and plastered three coat work, last coat to be hard finish, gauged high The attic closets may be laid on, the mortar to lie at least one week before using.

The mason will make all his work good, after all the other trades are done, and leave the building broom clean immediately after the plastering is done. This specification is intended to cover all mason work to fit the building ready for occupancy as per plan, but should anything have been omitted necessary to that end, it must be done without extra charge.

PAINTING.

All the exterior woodwork usually painted, including privy and blinds, to be painted two good coats of H. W. Johns' asbestos mixed paint, all knots and sap to be well shellacked before priming, all cracks, joints, and nail holes and over nail heads to be well puttied after priming is done, all tin work to have two coats. Also paint the chimneys two coats, all the colors to be selected by numbers from the card of colors. The interior will be finished with David B. Crockett's wood preservatives. Give the wood one coat, let stand twenty-four hours, then another coat, and rub down with curled hair or like material. Putty to match color of the wood. All the door saddles, hearth borders and hard floors to be finished in same manner. The painting must follow immediately after the carpenters.

PLUMBER'S SPECIFICATION.

Drain.—Furnish and put in where shown on the plans a 5″ cast iron drain pipe to run from inside of building out to the tile drain, 4′ outside of the building. Use Y branches for all iron pipe connections.

Soil.—Furnish and connect with the drain in cellar a 5″ cast iron soil pipe, and run same size up and out of roof at least 4′ above highest point, and cap the same with the "Smith" patent ventilating cap. Use Y branches for all waste connections. All the iron soil pipe to have a coat of asphaltum. The soil pipe to have a cleaning out cap in cellar.

Calking.—All joints of all iron pipes are to be thoroughly calked with picked oakum and molten lead and screwed in position with iron hooks. All joints between iron and lead pipes to be made with brass ferrules, to be calked into iron pipes and lead pipes soldered to it with wiped joints.

Boiler.—Furnish and put up, where shown on plans, a 40 gallon round head heavy pressure copper boiler, and provide with draw cock for emptying the boiler, and shut-off cocks, for shutting the water off from the second story, and provide with circulating pipes complete, connect boiler draw cock with the sink waste, have a ⅝″ stop cock on supply pipe and combined safe and vacuum valve on top of boiler. Boiler to be supplied with a "Lockwood" stand.

Supply.—Tap and pay for tapping the water main, and connect a ⅝ *aaa* supply, and run to the boiler. Supply to have a shut-off cock inside the cellar wall. All pipes are to be graded so they will drain perfectly dry, each floor to be controlled separately by shut-off cock. Where pipes will not drain dry, put in a small pet cock.

Sink.—To be a Mott's Eastlake galvanized, with back air chamber, and iron legs. Furnish and set up where shown in the kitchen an 18×30 sink, and supply with hot and cold water through ⅝″ *aaa* lead pipe and Fuller cocks, and to have 1½″ C lead waste pipe, properly tapped and connected with the drain, with a 2″ iron pipe to the main soil pipe. To have a cleaning cap on end of pipe under sink.

Bath.—Furnish and put up where shown a 16 oz. sheet copper bath tub 4½′ long, well tinned and planished. Supply with hot and cold water through ⅝ *aaa* lead pipe and nickel plated combination bath cock with rubber spray, to have 1⅛″ C waste and be properly tapped and connected with the soil. Bath to have nickel plated plug and chain. Overflow to be connected with waste.

Bowl.—Furnish and set where shown on the plans a 14″ marble Italian ware wash bowl, with marble countersunk top and surbases 10″ high; supply with hot and cold water through ½″ *aaa* lead pipe and nickel plated Fuller patented basin cocks, to have 1½″ C lead waste properly tapped and connected with the soil, to have nickel plated chain and stay and plug.

Cocks.—No cocks to be placed at the end of a line, but the pipe extended so as to prevent jarring directly on cock

Closet.—Furnish and set in the bath room, where shown on plans, supplied with water through 1¼″ pipe from cistern above, an "Inodoro" porcelain wash out closet, with suitable size cistern. The cistern to have the flush tank attached, supplied through ⅝ *aaa* pipe and have cistern valve and rubber ball complete. Ventilate the closet with a 3″ lead pipe connected with the iron vent. Closet cup and pull to be nickel plated and to be inserted in the seat. Closet to have enameled drip tray.

Safe Pans.—The bath tub, bowl, and closet are each to be provided with 3½ lb. lead safe pans, edges turned up 2″ all around, and to have a ¾″ lead waste pipe to the cellar.

Wash Trays.—Supply the wash trays with hot and cold water, through ⅝ *aaa* lead pipe and Fuller patented cocks, with flange and thimble. Provide with a 2″ main waste, properly tapped and connected to main soil. Provide necessary plugs and chains and flanges. Also provide on end of pipe a cleaning cap.

Ventilation.—Every trap through house to be separately and independently ventilated from the crown by the same size pipe as trap.

Gas Pipe.—Put up the gas pipes with outlets where shown on the plans and according to the rules of the gas light company. All outlets are to be capped and all pipes tested. All side lights are to be not less than 5′ 6″ from floor All drop lights are to be hung plumb.

Range.—Furnish, set, and make connections to water back, a No. 8 J. L. Mott's "Defiance" portable range.

BILL OF MATERIALS.

1 6″×10″×26′=130 sq. ft.			
1 3″× 8″×12′= 24 "			
1 3″× 8″×16′= 32 "			
1 3″× 8″×28′= 56 "			
1 3″× 8″×17′= 34 "			
1 3″× 8″×15′= 30 "			
1 3″× 8″×26′= 52 "			
1 3″× 8″×14′= 28 "			
9 2″×10″×21′=315 "			
3 2″×10″×24′=120 "			
6 2″×10″×26′=264 "			
4 2″×10″×29′=192 "			
1 2″×10″×12′= 20 "			
1 2″×10″×20′= 34 "			
7 2″×10″×18′=210 "			
4 2″×10″×17′=116 "			
12 2″×10″×28′=552 "			
20 2″× 8″×24′=640 "			
5 2″× 8″×17′=115 "			
7 4″× 6″×22′=308 "			
4 4″× 4″×12′= 64 "			
2 4″× 4″×13′= 33 "			
1 4″× 4″×15′= 20 "			
3 4″× 4″×24′= 96 "			
1 4″× 4″×17′= 23 "			
1 4″× 4″×18′= 24 "			
4 4″× 4″×14′= 76 "			
1 4″× 4″×20′= 27 "			
2 4″× 4″×16′= 42 "			
1 4″× 4″×22′= 29 "			
2 3″× 6″×16′= 48 "			
1 3″× 6″×12′= 18 "			
3 2″× 6″×15′= 45 "			
33 2″× 6″×18′=594 "	=4,391 ft. spruce timber, At per M..	$20 00	$87 82
300 2″× 4″×12′=2,400 sq. ft.			
250 2″× 4″×13′=2,166 "	= 4,566 ft. hemlock, At per M...	$15 00	$68 49
2,500 ft. hemlock sheathing, per M.		15 00	37 50
1,500 ft. hemlock sheathing, for roofs, per M.		15 00	22 50
2,250 ft. 6″ siding, per M.		25 00	56 25
100 ft. shingling, per ft.		6	6 00
185 ft. piazza floor, per ft		3½	6 47
200 ft. piazza ceiling, per ft.		3½	7 00
4 piazza columns.			8 00
2 short columns.			2 00
8 piazza brackets, each.		30	2 40
27 ft. piazza rail, per ft		25	6 75
2 stoops, ready to put up.			9 00
Lattice under piazzas.			7 00
Cellar door outside			6 00
72 ft. verge boards, per ft.		8	5 76
68 ft. gutter and tin.		15	10 20
140 ft. cornice, per ft		12	16 80
110 ft. piazza and flat roof cornice.		10	11 00
400 ft. tin roof.		6¼	26 00
Leaders.			7 50
1,225 ft. slate roof, per sq. ft.		7	85 75
150 ft. water table and piazza fascia.		5	7 50
2,800 ft. flooring, per sq. ft		3	84 00
300 ft. corner boards, etc.		3	9 00
6 cellar windows, complete.		1 50	9 00
13 first story windows, complete.		8 00	104 00
7 second story windows, complete.		8 00	56 00
5 third story windows, complete.		7 00	35 00
Front door and frame, complete.			10 00
20 inside doors, complete.		6 50	130 00
300 ft. surbase.		4	12 00
Cellar stairs, complete.			5 00
Main stairs, complete			80 00
Prepared materials for closets.			25 00
Nails, papering, etc.			30 00
Labor.			325 00
Painting.			100 00
Plumbing.			275 00
Mason work.			700 00
Total			$2,492 69

A KANSAS CITY RESIDENCE.

The handsome new residence illustrated in the colored plate of the present issue is on a pleasantly located lot on the west side of Garfield Avenue, between Independence and Lexington Avenues, Kansas City, Missouri, for Robert Beatty, Jr., Esq.

The building fronts east and south, the principal front facing the east. It sets back a sufficient distance from the road to allow of a fine lawn being formed in front, and presents with its well arranged sky lines and spacious covered balconies a very attractive and imposing structure.

The exterior walls are all constructed of pressed brick, laid in red cement mortar; the roof is covered in with slates, and the woodwork is painted in pleasing colors.

The exact construction of the house is indicated by the specification printed below, from which it will be seen that the reception hall, sitting room, and stair-

way are finished in red oak, the newel and the balusters of stairs are "spiral turned," as shown on our sheet of details. The dining room is finished in white oak, the parlor in cherry, and the kitchen and second story all in natural woods, finished with three coats of oil and white shellac

The mantels are of wood, correspond in general design with the trim, and have "over-mantels" and beveled plate glass mirrors. The house is furnished throughout with a complete system of speaking tubes, electric bells, annunciators, etc.

The system of heating is hot air, supplied by a McGee furnace, and distributed to all rooms except kitchen and servants' room. This, in conjunction with the fireplaces, proves most economical, and insures a more perfect ventilation, as in early spring and autumn fires may be lighted on the hearths without resorting to the furnace, and in colder weather both may be used.

James W. Bryan, of No. 110 Vine Street, Kansas City, Mo., is the architect of the house, and Charles K. Balcom, of Kansas City, is the builder.

The cost of the residence as represented was $7,500.

GENERAL CONDITIONS.

The contractor to furnish *all* transportation, labor, materials, and utensils necessary for performing and completing the work. All materials to be the *best* of their respective kinds, and the work to be executed in a thorough and workmanlike manner, according to the true spirit and meaning of the drawings and these specifications, which are intended to include everything necessary for the proper finishing of the work, whether every item necessary to that end is particularly mentioned herein or not The contractor is to furnish and pay for the necessary building permit, to be responsible for all violations of the city building laws, and to obtain official licenses from the proper authorities for openings into the public sewers, and pay all fees for same.

MASON.

Excavation.—Excavate the entire area occupied by the building for a cellar, to the depth as shown on section, the excavation to extend six inches beyond the wall line everywhere.

Trenches.—The trenches to be three feet wide and carried twelve inches below the cellar bottom. Dig the required trench for the dwarf walls of veranda and carriage porch, the same to be not less than two feet below the surface, by the required width.

Vault.—Excavate a privy vault where directed, the same to be 3 × 5 in plan, by 8′ deep.

Cistern.—Also excavate for a cistern where shown 8 × 18. All earth taken from excavations to be carted off the premises.

Stone Work.—The footings to be of good flat stone, 12″ thick, projecting 6″ beyond the wall line, and firmly embedded into the earth. The footing course to be flushed up with "spawls" and liquid cement, and allowed to set, before starting the foundation walls, include an 18″ × 12″ rubble footing for the partition wall in cellar, and the dwarf walls of porches.

Foundation.– Build the foundation walls of good flat building stone, thoroughly bonded with ample headers in every course. The walls built to a line both sides, carried up perfectly plumb, and finished to the proper level heights Particular attention to be paid to angles, that they correspond exactly with the "*figured dimensions*" of the plans. All frames to be walled in perfectly plumb, square, level, and in their several proper positions, as figured on plans.

Sills.—Provide for the rear cellar door a 19″ × 5″ ×3′ 10″ plain sill of Cottonwood Falls stone. Use rubble sills elsewhere.

Mortar.—All rubble work to be thoroughly pointed up both sides of wall. The mortar to consist of Springfield white lime, Craig & Roberts washed sand, mixed in the proper proportions. Add one bushel Louisville cement to three bushels lime, the cement to be added when needed for actual use only, and none allowed to stand overnight, or to be retempered.

Range Work.—Build four courses of range on front wall where shown on plan. The same to have 6″ bed, 10″ face (rock face), each course to be thoroughly anchored to backing. All range stone to be laid in cement, and pointed with a tucking tool after settling has taken place. Include carriage porch in the above work.

Water Table.—The water table to have 5″ bed, 8″ face, and 1″ wash.

Window Sills —All window sills to have 5″ face by the required bed and length.

Lintels and Springers.—The lintels over doors and windows to have 10½″ rock face. Prepare the springers for second story windows as shown on drawings.

Door Sills.—All door sills to have 8″ face, 14″ bed, 1″ drip channels, and 4″ lugs, all of Cottonwood Falls stone. The water table, window sills, and all caps and springers to be of "light" Warensburg stone.

Brick Work.—All bricks used on the exterior surface of walls are to be the Kansas City calorific pressed brick (AA), gauged to uniform thickness, and laid in red mortar. The red mortar used to be guaranteed permanent color. The joints and beds of pressed brick work not to exceed $\frac{3}{16}$″ in thickness, or four courses of brick not to exceed 10½″ in height. All walls to be carried up perfectly plumb and straight, and finished to the proper level heights. Clip the brick every seventh course for blind headers. Back up the pressed brick with good hard burnt common brick with solid flushed joints, leaving no empty spaces in the walls. Include 9″ partition wall in cellar.

Arches.—Turn relieving arches at the back of all stone lintels, and in other places where required. Turn 4″ trimmer arches for the support of all hearths.

Chimneys.—Cap out the chimneys as shown on elevation, leaving the flues of the size as figured on plans, outside walls of each chimney to be 8″ thick and the partitions 4″. All flues to be thoroughly plastered inside. Build the several fireplaces as shown, the back of all fireplaces to be 9″ thick.

Thimbles.—The brick mason to furnish and set all thimbles required in flues, and project far enough to receive plaster, the same to be put in at the time the chimneys are built.

Finally, clean down all pressed brick with diluted acid, without defacing stone work, and leave all complete.

CARPENTRY.

Frame all timbers. Joists, partition studs, balcony joists, rafters, lintels, etc., are to be No. 1 W. P., and constructed according to the sections and detail drawings. All floor joist to be sized with a crown of ½″ on upper edge. For size of joist, rafters, etc., see sections. A header and trimmer to be put in double, and place double joist under all partitions running in same direction. All joist, studding, furring, etc., to be set 16″ on centers. Double stud around all openings, and place headers 4′ high.

Lintels.—Place all necessary wood lintels to all openings requiring it.

Furring.—Fur all brick walls with 1 × 2 furring strips, 16″ on centers, vertically, and well spiked to plugging in brick joints.

Bond Timbers.—Furnish all bond timbers and wood brick for insertion in walls, necessary for the proper execution of the work to be finished.

Roof.—Construct the roof as shown on roof plan, using 2 × 6 rafters. All valley rafters to be 2 × 8, and all firmly secured to walls, with all necessary iron straps, anchors, rods, and bolts, as shown on detail drawing. The rafters tied with 2 × 6 cellar beams, 8″ above attic floor line. Provide and firmly set in proper position the "lookouts" for the projecting eaves, as shown on detail.

Cornice.—The circled cornice on dormer windows from bath room to be of No. 27 galvanized iron, well soldered and riveted together, and all requisite weather joints as shown.

Sheathing.—The entire roof, including porches and balconies, to be tight sheathed with No. 2 surfaced sheathing boards, square edge, thoroughly nailed at every bearing.

Floors.—All floors, except kitchen, to be laid with first common white pine. Flooring tongued and grooved, well mill worked and blind nailed at every bearing with 8d. nails. Treat porch and balcony floors with like material. Lay the kitchen floor with ⅞ × 3½ Georgia pine, selected for close, even grain, carefully laid with close fitting joints, and all to be hand smoothed after laying, and all prepared for waxing, and kept protected from damage. The kitchen floor is not to be laid until the plastering is finished.

Attic Floor.—Lay the attic floor with Selfen flooring.

Wainscot.—Wainscot the kitchen 3′ and the bath room 4′ high, with narrow beaded T. pine wainscoting ⅝ thick, thoroughly hand smoothed, and finished with cap and base, as shown on detail.

Frames.—Make all door and window frames of the sizes as figured on plans. All windows to have box frames with 1′ 8″ pulley styles, made in the usual way. All exterior door frames to have paneled jambs 1¾″ thick, rabbeted. All interior door frames on first floor to have rabbeted jambs of the same kinds of wood as the finish of rooms in which they show. All frames on second floor to have 1⅜″ rabbeted jambs of clear white pine. All door frames that are marked with the specific "T" to have transoms of sufficient size to bring the frames to a uniform height.

Doors.—All doors of the sizes as figured on plans. Those showing into reception hall, parlor, dining room, and sitting room, to have veneering ¼″ thick each side, and finished 2¼″ thick, all other doors No. 1, 1¾″ white pine.

Trim.—The reception hall will be trimmed with red oak; dining room and sitting room, white oak; parlor, cherry; kitchen, T. pine; all rooms on second floor, white pine. The dado in hall, dining room, and sitting room, and all trim throughout, to be in strict accordance with detail drawing. Interior woodwork to be finished up perfectly clean, well hand smoothed, scraped, and brought to a true and even surface, and all marks and stains removed on such work as requires finishing in natural manner.

Porch and Balconies.—Construct the porches and balconies as shown, using 6″×6″ turned posts of poplar, 2¼″×2¼″ turned balusters, 3½×3½ hand and foot rail of white pine, all as shown on detail drawings. All porch and balcony floors to pitch one inch from building, and white leaded at joints, each course to be one continuous piece, and all blind nailed at each bearing.

Closets.—Form closets as shown, and fit up the same with 7″ band, with 10″ shelf above. Place three-pronged coppered wardrobe hooks on the band, not less than 8″ apart.

Pantry.—Fit up the pantry with counter shelf 18″ wide, 3′ above the floor, and place five 10″ shelves above counter. Place under counter shelf a case of four drawers, the full depth of counter, all to be firmly dadoed together.

China Closet.—Fit up the china closet with counter shelf, 2′ 10″ above floor, and place six portable shelves above. Below the counter shelf put in a case of drawers as directed, the same to be provided with locks and ornamental pulls. The shelving above counter to be fitted with glass doors hung with brass butts, as directed.

Main Stairs.—The entire stairway, including the floors of landing, to be built of thoroughly seasoned red oak, the newels and balusters to be spiral turned as shown, the newel to be glued up of seasoned plank, and warranted, the risers 1″, treads 1¼″, housed into stringers both ends, the risers and treads tongued and grooved to each other both front and back, thoroughly wedged and pinned and glued up everywhere, the face string and coping moulded and paneled and wrought in the manner as shown.

Servants' and Attic Stair.—Build the servants' and attic stairs as shown on plans, using ⅞″ risers, 1⅛″ treads of B. S. W. P., neatly and securely put together, all boxed.

LATH AND PLASTER.

Lath the building with good, sound, straight grained lath, free from loose knots and bark. All lathing to be horizontal. No vertical lathing permitted in any case. No lath allowed to pass behind the studs from one room to another, all corners and angles made solid everywhere; should there be any stud or angle not securely tied, stop and notify carpenter, and see that they are corrected and made permanent before the lath goes on.

Plaster all walls and ceilings with good coats of hair and brown mortar, made of the best Springfield lime, thoroughly slaked and mixed with the proper proportions of "Craig & Roberts" washed sand, well whipped ox hair, all to be thoroughly mixed on the premises at least ten days before using.

All plastering to be properly put on and applied with sufficient force to secure good clinches. Level and float the brown coat and bring it true and straight with the grounds everywhere, and the ceilings brought to a true and even plane. All plastering to be carried down to floor, whether wainscoted or not.

Finishing coat to be put on after the other coats are thoroughly dry, and to be compounded with "lime putty" and "Bronson's marble finish," mixed in three parts of marble finish and two parts lime putty, and allowed to stand two days before using, and to be applied in a careful manner, as directed, so as to secure a good and workmanlike job.

The plasterer to do all necessary patching and repairing after other mechanics are through without extra charge, and clean out the building, leaving the same broom clean, and remove all rubbish from the premises that has accumulated from his work.

PAINTING AND GLAZING.

Paint all the exterior wood, tin, and galvanized iron work that is usually painted, three good coats of lead and oil, in such colors as directed. Pure linseed oil, pure American lead, and the best shellac to be used throughout, all exterior woodwork to be primed as soon as work is up. All tin and galvanized iron work to be primed with a heavy coat of red lead.

All colors to have good body, well and evenly laid on, covering every portion. All exterior painting to be done as far as possible in dry (not dusty) weather.

All damage done by wind or rain to be made good by painter, and all to be left in good order when building is done.

INTERIOR WORK.

All hardwood on first floor to be filled with Wheeler patent filler, thoroughly rubbed and cleaned off shortly after putting it on, and while wet, and finish with two coats of the "Murphy Transparent Wood Finish Interior," well rubbed with rags each coat, and finish to a true and even surface. Treat the kitchen and bath room with two coats in like manner. All woodwork on second floor, except bath room, to receive three coats of lead and oil in such tints as directed. The hall to be grained to correspond with stairway, and receive one coat of best coach varnish.

Glazing.—Glaze all windows with the best American A. A. D. S. glass, free from waves, curls, and smoke stains, thoroughly beaded, and puttied and pinned with glaziers' points.

Ornamental Glass Work.—The transom over parlor window, the upper panels of reception hall doors, and the stair window to be lead glazed, with opalescent stained glass of a neat design, costing not less than

$5 per square foot All work in this line to be first class in every particular.

Galvanized Iron Work.—Make all crestings, finials, gutters, and conductors of galvanized iron, No. 27. The crestings, gutters, and finials constructed as per detail, and the rain water conductor to be 4″ in diameter, corrugated, with all requisite elbows and branches, with a reversible cut-off at grade, connecting with earthen drains leading to cistern and drains.

Slating.—Cover the entire roof, dormers and dormer cheeks, porch, and balcony roofs with the best quality Pennsylvania black slate, 10″×18″, all laid on a bed of best tarred paper, carefully stretched, lapped, and tacked on. Place suitable tiling strips at all eaves, and secure each slate with two galvanized nails. The cheeks of all dormers, chimneys, and all places requiring it, to be flashed with good quality of zinc, the slater to include zinc. Valley of sufficient width. The slater will be held responsible that he furnishes ample flashing stock, and deliver up work complete in every particular.

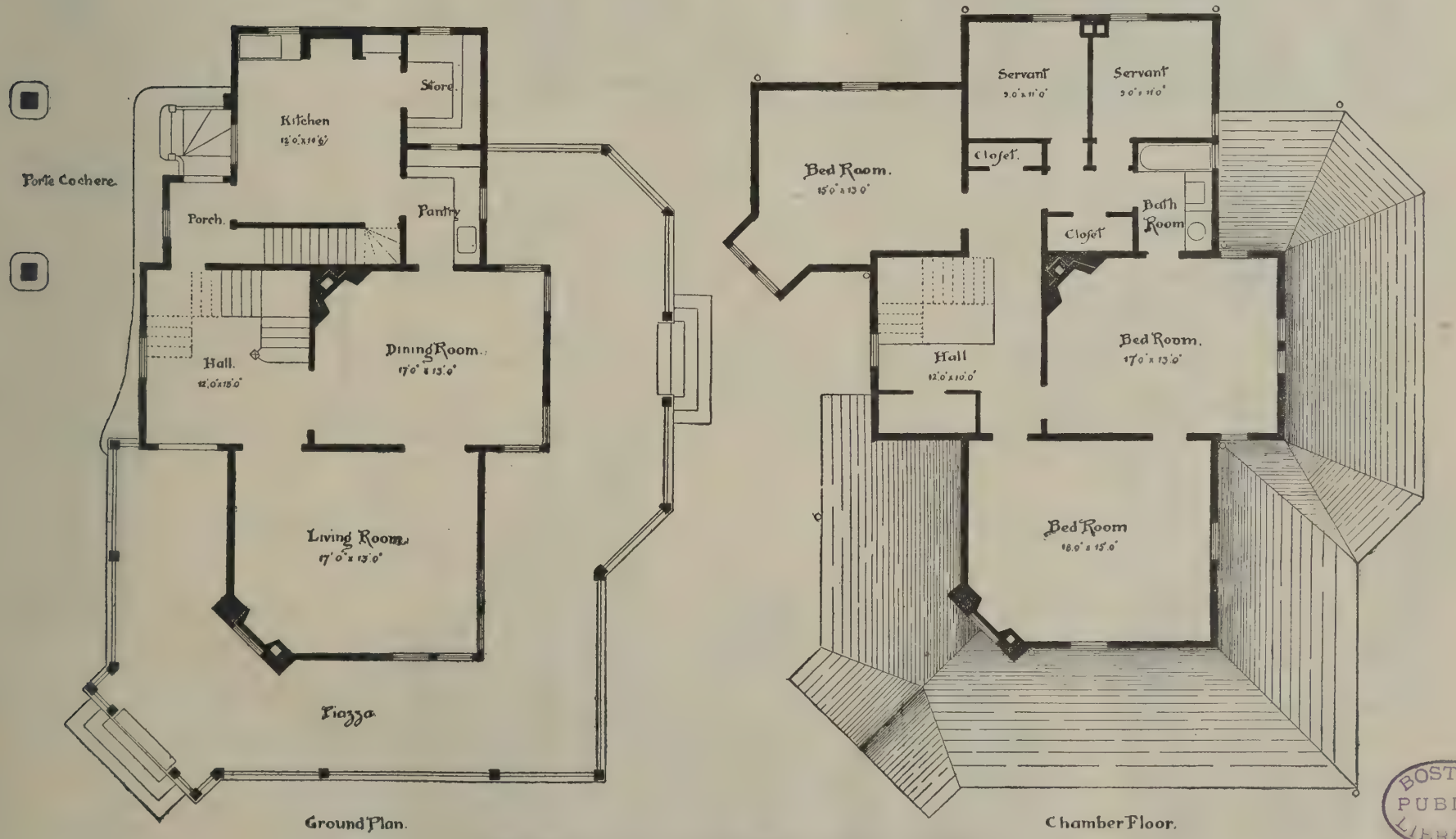
Gas Piping.—Fit up the house with the requisite size gas pipe, leaving drop and bracket lights where shown on plans. All work inthis line to be done in accordance with the rules and regulations of the Kansas City Gas Light Company, and to be paid for on their respective certificates

Plumbing.—Provide and put in complete working order, with necessary cocks, plugs, traps, fittings, and connections.

Place in the bath room a fourteen ounce copper planished tub, with all requisite nickel plated fittings. Include an approved closet, as shown, and a 14″ countersunk wash bowl, with moulded top, sides, and back of the best Italian marble. Provide for the kitchen a 20″×30″×6″ white enameled sink, where shown, and put in position in the kitchen a galvanized iron boiler, with inside strengthening rings, cast heads, and all requisite couplings, complete, the boiler to have a capacity of forty gallons, resting on cast iron standards. Hot water to be taken from boiler and carried to sink, wash bowl and bath tub on second floor. Place 3 lb. lead safings, turned up 1½″ and sloped to drain themselves. All lead supply pipes from city pressure to be extra strong, and wastes light. In putting up pipes, care is to be taken to have them so the whole system can be drained at will, and all as secure as possible from frost, and left accessible for inspection and repairs. The soil pipe to be 4″ cast iron, thoroughly tarred inside and out. The joints of soil pipe to be fitted into hubs or sleeves, and run with melted lead on hemp gasket and calked tight. The soil pipe to connect with earthen drain in cellar, pass up through the building, and extending at least two feet out of roof, and covered with ventilating cap, and properly connected by Y or T branches to all wastes, traps, etc. Make all connections with the city mains and public sewer, and include approved iron box and stop in sidewalk, and lawn sprinkler, where directed. Put separate stop and waste on service under house, and at the foot of every riser. Test all pipes for leakage, and leave the entire job in a complete working condition.

A RESIDENCE AT PROVIDENCE, R. I.

We illustrate herewith, by perspective and plans, an attractive residence lately built at Providence, R. I., at a cost of $5,500, E. I. Nickerson, architect. This building has a number of desirable features, and the plans will well repay examination.



A RESIDENCE AT PROVIDENCE, RHODE ISLAND.

Plans and Specifications.

Full plans, specifications, and sheets of details, complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including churches, colleges, schools, stores, dwellings, carriage houses, barns, etc.

We are assisted in this work by able architects. Terms moderate. MUNN & CO.,

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A $3,500 DWELLING.

We give herewith elevations and plans for a $3,500 house, by H. C. Palmer, architect, to be erected at Jersey City Heights, N. J. The estimate includes the "modern conveniences." The house presents a pleasing appearance, and the plans are considered satisfactory.

Women as Architects.

C. Harrison Townsend, a London architect of some note, writes in the *Pall Mall Gazette* on this subject. His remarks refer to the girl and young woman of the middle class, and he asks, "What really valid objection is there to asking her to become a 'draughtswoman,' and in due course an architect?"

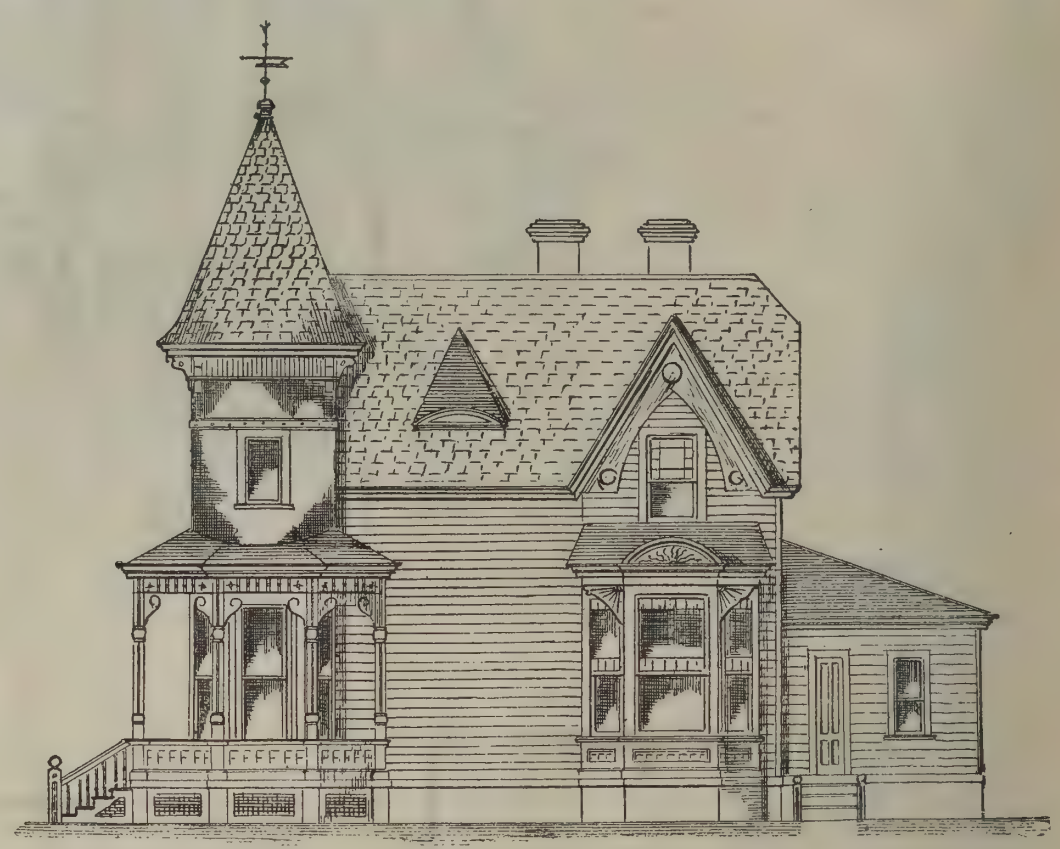
The requisites for the preparation of architectural drawings are neatness and delicacy of touch, attention to detail, patience, and care, which women ought to possess more than men.

The present course of architectural training in England is as follows:

A youth on leaving school with an aptitude, more or less, for the profession, is articled as pupil for four or five years to an architect, to whom he pays a premium. This is, of course, in proportion to the position and repute of the architect in question, but may be stated at from a hundred pounds to four or five times that amount. As with solicitors, so among architects, the pupil is supposed, by having "the run of the office," to acquire an intimate knowledge of its work—design, draughtsmanship, knowledge of materials, official routine, and so on. If a young fellow of parts, he soon begins "to feel his legs" and to understand his work, and, if wise, supplements his office instruction by attendance at the admirable classes of the architectural association and elsewhere. At the end of his articles he is qualified to dub himself a "junior draughtsman," in which capacity he claims salary from a pound to two pounds a week. A couple of years should then see him a draughtsman proper, and in a position to obtain three, three and a half, or four guineas a week. In many cases, of course, thanks to such "backing" of his friends as he may be fortunate enough to get, the lucky pupil can set up on his own account immediately his articles are completed.

In this training Mr. Townsend finds but two objections. The first one is the "commingling of the sexes" which would result from their introduction to an office. This objection is proved to be invalid by the American experience in using females in all kinds of office work without trouble. But a "women clerks' room" would remove that conservative objection. The other objection is that attached to the inspection of buildings under construction. To those not wishing to encounter this objection, the way to drawing board work and competition in plans, interior decoration, etc., is open.

FRONT



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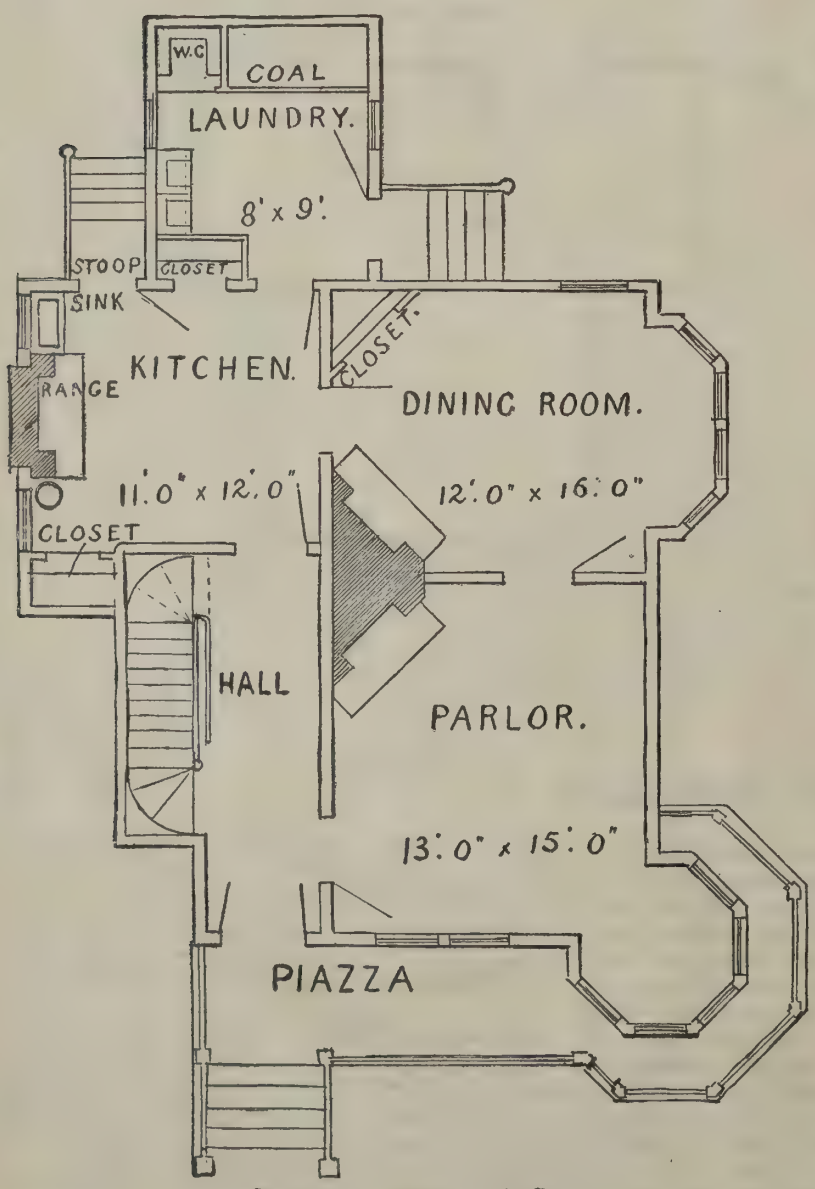
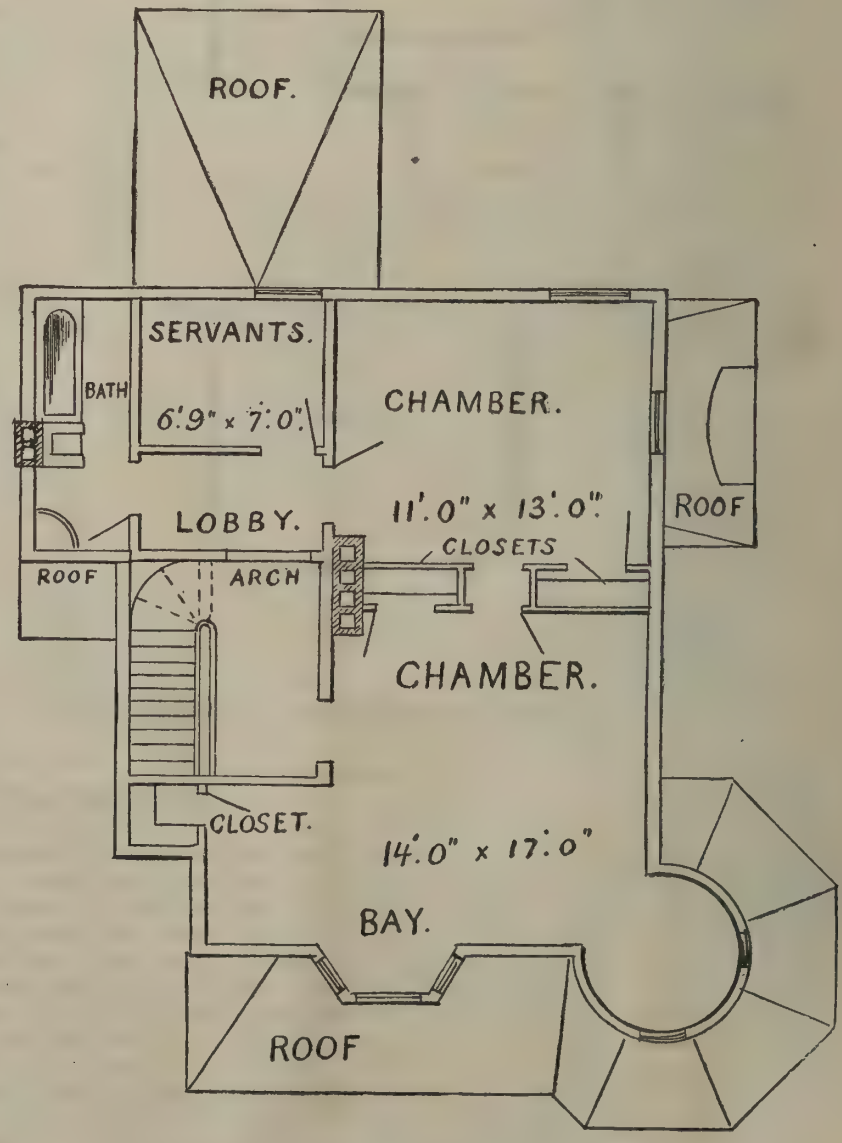


FIRST FLOOR.



SECOND FLOOR.

A $3,500 DWELLING.

A DWELLING AT EAST NEW YORK.

Our engraving shows a pleasing dwelling erected at East New York. The cost is about thirty-five hundred dollars It has an ample piazza, and the interior arrangement is good.

Terra Cotta Panels.

The way in which terra cottas were introduced into walls was not unlike that commonly used for inserting stone, marble, corbels, and jambs of stone. It is evi dent that the general skeleton of the wall was first constructed, keeping some bricks protruding, so that afterward the casts, figures, heads, cornices, and such like might be introduced into the interstices left between brick and brick out of the redundant material beyond the substance of the wall itself. Such pieces, if flat or slightly salient, were fixed in simply with lime and plaster; at the most, for greater strength, hooks of iron or mere nails were used. Large blocks were secured in the same way as corbels or stone cornices. They took, however, the precaution to hollow out by hand such figures as required to be fixed to the bricks that jutted beyond the wall level—sometimes, also, in order to lighten them, or to promote the uniform burning of large pieces, such as large heads and statues. The utmost care to strengthen them was bestowed on the first rows of cornices and on such architectural members as had to sustain others; these upper portions, on the contrary, being borne by the lower and fixed to the wall as best might be without any extreme care, but never made salient by excessive or abrupt protrusion. They are always graduated and pitched, so that rain water may never flow down behind, but invariably along their front. In Italy, through the sudden changes of temperature, frost will soon split the hardest marbles; nevertheless, although these terra cottas are not attached to the wall in a very elaborate fashion, yet in consequence of the builders' precautions to prevent water standing on them, they appear little injured by frost.—*V. Ottolini.*

Dumb Waiters.

The use of dumb waiters in private houses, apartments, flats, tenements, stores, and for light factory work, is largely on the increase, owing probably to the simplification and uniform construction in respect to sizes; and would have been much larger but for the many obstacles in their way, such as the many sizes required, the high price asked, and the complicated mechanism of adjusting them—most fixtures requiring the services of a man skilled in the business to put them up.

All these objections are overcome in the New York Safety Dumb Waiter, as the fixtures are made in one size only, and this is adapted to any size waiter. They are put up one complete set in a box, weighing, all told, about forty-five pounds; are handsomely bronzed; and are so simple to adjust that any carpenter, by the aid of the diagram and instructions which accompany each set, can place them in position.

Dumb waiters have heretofore caused more or less trouble, by the ropes holding them giving out and letting the car fall, often causing great damage, and in some cases serious accidents. The safety rope attachment with which these fixtures are provided, and from which they derive part of their name, prevents this, as a second rope put on slack, and on which there is no work or wear, immediately comes into play and prevents falling or accident, should the hoisting rope break. Another complete and desirable arrangement is the cam brake attachment, by which the car of the waiter can be held at any desired point when loaded beyond balance, and which can be operated from any floor. The adjustment of these fixtures allows the car to run closer to the floor at bottom and nearer to the ceiling at top than any other made, a desirable feature, especially when heavy articles have to be carried.

A full sized model waiter is running at the store of Messrs. John H. Graham & Co., 113 Chambers St., New York, who are the manufacturers' agents. These fixtures are protected by letters patent, and are made and controlled by the Edward Storm Spring Co. (Limited), Poughkeepsie, N. Y., manufacturers of the Edward Storm side bar springs and hardware specialties. Illustrated catalogues with full descriptions can be obtained from them or from their New York agents on application, and we would advise any of our readers who may need a dumb waiter to send for one of these catalogues.

A DWELLING AT EAST NEW YORK.

NEW POST OFFICE, SPRINGFIELD, OHIO.

We give an illustration from the *American Architect* of the new post office building at Springfield, Ohio, M. E. Bell supervising architect. It is a substantial structure, effective and satisfactory in appearance.

Acoustic Effects of the Britannia Bridge.

Some of the acoustic effects produced by the bridge are interesting. The report of a pistol fired beneath the tubes is repeated three or four times. In this particular, however, they are far surpassed by the large brick arches constructed by Mr. Brunel over the Thames at Maidenhead, under which the echo of a pistol is repeated from twelve to twenty times. The rapid repetition of echoes from each of the T irons on the side of the tube gives rise to a shrill, whirring musical note. When any violent noise is produced on the adjacent shore the note is the same, whether produced by the blows of the riveters or the report of cannon, and corresponds to the low D on a concert flute. The distance between the T irons is two feet. If the same note is sounded by a flute close beside one of the tubes, it is a perfectly soft and musical tone, which lasts many seconds. The report of a pistol produces the same effect much more powerfully. The effect of music in the interior is very striking, and a concert which was given in one of the tubes to the workmen was very effective. The floor was boarded, and the interior being illuminated by several thousands of candles, had a most imposing and gorgeous appearance. The cells of the top and bottom form excellent speaking tubes, and conversation may be carried on through them even in a faint whisper. By elevating the voice, persons may converse through the entire length of the bridge, a distance of more than 500 yards. If one end of the cells be closed, they return a powerful echo; but although a whisper is thus distinctly repeated, the loudest whistle does not appear capable of returning any echo.—*E. Clark.*

Green or Dry.

"Which is the stronger—green or dry timber?" This question is now under discussion by many of the leading lumber journals, and has provoked a perfect avalanche of opinions from experts and others. This discussion, after all, seems rather bootless. Some kinds of timber are stronger when wet or green. All woods are harder and less liable to bend when dry than when wet or green; but most hard woods when wet possess more tensile strength than when dry. Timber thoroughly seasoned is more brittle than when green, and with the necessary force will break square off, while the same timber green would stand about the same pressure by bending without breaking. Take a hickory sapling that it is almost impossible to break in its green state, although it may bend double, and after it is thoroughly dry one may easily break it almost "square off." So with almost any kind of timber. Dryness makes it stiffer, more unyielding, but in very few instances stronger.—*Dixie.*

WILLOW furniture can be cleaned by using salt and water. Apply with a nail brush, scrub well, and dry thoroughly.

THE NEW POST OFFICE, SPRINGFIELD, OHIO.

A MODERN ENGLISH DWELLING, MOWBRAY COTTAGE, EAST FINCHLEY.

This is a small house, built recently, in an old detached garden. The exterior is of stock bricks, with moulded red facings. The upper story is rough cast, and the roofs are covered with red plain tiles. Internally, the house has some good rooms (the dining room being 20 ft. by 14 ft., exclusive of bay), and is most carefully finished, a special feature being the woodwork. The cost was about $7,500. The architect is Mr. C. E. Sayer, 17 Soho Sq., London.—*The Architect.*

Regulation of Building in Boston.

The following sections are from the revised ordinances of Boston, Mass., for 1885, to regulate plumbing and vaults and drains:

PLUMBING.

SECTION 1. No person shall carry on the business of plumbing unless he shall have first registered his name and place of business in the office of the inspector of buildings, and notice of any change in the place of business of a registered plumber shall be immediately given to said inspector.

SEC. 2. Every plumber, before doing any work in a building, shall, except in the case of the repair of leaks, file at the office of the said inspector, upon blanks to be provided for the purpose, a notice of the work to be performed, and no such work shall be done in any building without the approval of said inspector.

SEC 3. Every building shall be separately and independently connected with the public sewer, when such sewer is provided, and, if such sewer is not provided, with a brick and cement cesspool of a capacity to be approved by the said inspector.

SEC. 4. Drains and soil pipes through which water and sewage are used and carried shall be of iron when within a building, and for a distance of not less than five feet outside of the foundation walls thereof. They shall be sound, free from holes and other defects, of a uniform thickness of not less than one-eighth of an inch for a diameter of four inches or less, or five thirty-seconds of an inch for a diameter of five or six inches, with a proportional increase of thickness for a greater diameter. They shall be securely ironed to walls, laid in trenches to uniform grade, or suspended to floor timbers by strong iron hangers, as the said inspector may direct. They shall be supplied with a suitable trap, placed, with an accessible clean out, either outside or inside the foundation wall of the building. They shall have a proper fall toward the drain or sewer, and soil pipes shall be carried out through the roof, open and undiminished in size, to such height as may be directed by the said inspector, but no soil pipe shall be carried to a height less than two feet above the roof. Changes in direction shall be made with curved pipes, and connections with horizontal pipes shall be made with Y branches.

SEC. 5. Rain water leaders, when connected with soil or drain pipes, shall be suitably trapped.

SEC. 6. Sewer, soil pipe, or waste pipe ventilators shall not be constructed of brick, sheet metal, or earthenware, and chimney flues shall not be used as such ventilators.

SEC. 7. Iron pipes, before being put in place, shall be first tested by the water or kerosene test, and then coated inside and out with coal tar pitch, applied hot, or with paint, or with some equivalent substance. Joints shall be run with molten lead, and thoroughly calked and made tight. Connection of lead pipes with iron pipes shall be made with brass ferrules, properly soldered and calked to the iron.

SEC. 8. Every sink, basin, bath tub, water closet, slop hopper, and each set of trays, and every fixture having a waste pipe, shall be furnished with a trap, which shall be placed as near as practicable to the fixture that it serves. Traps shall be protected from siphonage or air pressure by special air pipes of a size not less than the waste pipe; but air pipes for water closet traps shall be of not less than two inch bore for thirty feet or less, and of not less than three inch bore for more than thirty feet. Air pipes shall be run as direct as practicable, and shall be of not less than four inch bore where they pass through the roof. Two or more air pipes may be connected together or with a soil pipe, but in every case of connection with a soil pipe, such connection shall be above the upper fixture of the building.

SEC. 9. Drip or overflow pipes from safes under water closets and other fixtures, or from tanks or cisterns, shall be run to some place in open sight, and in no case shall any such pipe be connected directly with a drain, waste pipe, or soil pipe.

SEC. 10. Waste pipes from refrigerators, or other receptacles in which provisions are stored, shall not be connected with a drain, soil pipe, or other waste pipe, unless such waste pipes are provided with traps, suitably ventilated, and in every case there shall be an open tray between the trap and refrigerator.

SEC. 11. Every water closet, or line of water closets, on the same floor, shall be supplied with water from a tank or cistern, and the flushing pipe shall not be less than one inch in diameter. But this requirement shall not apply to water closets substituted for vaults, where the same are located outside of the building proper, and water closets may be arranged so as to receive their supply directly from the main with such fixtures as shall be approved by the inspector of buildings, and by the water board and the board of health.

SEC. 12. Pipes and other fixtures shall not be covered or concealed from view until after the work has been examined by the said inspector, and he shall be notified by the plumber when the work is sufficiently advanced for inspection.

SEC. 13. Plumbing work shall not be used unless the same has first been tested by the said inspector with the peppermint, ether, or water test, and by him found satisfactory.

SEC. 14. No steam exhaust shall be connected with any soil or waste pipe, or drain which communicates with a public sewer.

SEC. 15. Water pipes in places exposed to frost shall be packed with mineral wool, or other substance equally good, and they shall be cased to the satisfaction of the said inspector.

SEC. 16. A grease trap shall be constructed under the sink of every hotel, eating house, restaurant, or other public cooking establishment.

SEC. 17. The provisions of sections three to thirteen inclusive, and of section fifteen, of this chapter, shall apply only to buildings erected, or to work performed, after the seventeenth day of March in the year eighteen hundred and eighty-three.

VAULTS AND DRAINS.

SEC. 18. The owner, agent, occupant, or other person

A MODERN ENGLISH DWELLING—CHARLES E. SAYER, ARCHITECT.

having care of a building used as a dwelling, tenement, or lodging house, or where persons are employed, shall furnish the same with one or more suitable water closets, or, where such building is located on a street in which there is no public sewer, with a suitable privy, the vault of which shall be built in the manner hereinafter prescribed, and shall be of a capacity proportionate to the number of inhabitants of such building, or of those having occasion to use such privy. Every such building situated on a street in which there is a sewer shall have water closets, and shall not have a cesspool or privy connected with it, except where, in the opinion of the board of health, it can be allowed to remain for a longer time, and then only as said board shall approve. And whoever neglects to comply with the provisions of this section shall be liable to a penalty of not less than five nor more than one hundred dollars, or by confinement in the house of correction not exceeding sixty days.

SEC. 19. Every privy vault shall be made of brick and cement, and shall be of a capacity of at least eighty cubic feet, and the inside thereof shall be at least two feet distant from the line of any adjoining lot, unless by the consent of the owner of such lot, and at the same distance from any street or public or private passageway, and every vault shall be so constructed as to be conveniently approached, opened, and cleaned, and shall be made tight, so that the contents thereof cannot escape therefrom.

SEC. 20. All waste water and all matter discharged from water closets shall be conveyed through sufficient drains, under ground, to a common sewer, or to such reservoir, sunk under ground, as may be approved by the superintendent of sewers, and no person shall suffer waste or stagnant water to remain in a cellar or upon a lot or vacant ground owned or occupied by him.

A RESIDENCE AT EAST ORANGE.

We give a sketch of a new residence on Arlington Avenue, East Orange, N. J., erected not long ago, A. M. Stuckert, Newark, N. J., architect. This house can be built for about $4,500. Those who like variety of forms and angles, both for interior and exterior, will doubtless find something of interest in this illustration.

THE DUOMO OF FLORENCE.

The unveiling of the new facade of the Duomo of Florence on May 3 last marks the practical completion of this great building, which has been intermittently in progress during nearly six centuries. The present cathedral was begun in 1294, on the site of a small and ugly church, Arnolfo di Lapo being appointed chief constructor. After a few years of suspened operations, Giotto was made head master, but died after three years of superintendence, and was succeeded by Francisco Talenti (1357–76), by whom the plan was extended. The next great name associated with the enterprise is that of Brunelleschi, from whose model, chosen in competition with fifteen others, the eight-sided cupola was built. The new front just unveiled was also a competition design, prepared twenty years ago by De Fabris, who, like all his predecessors, died before the work he devised was completed. Since the death of De Fabris, the work has been carried on by his assistant, Del Moro. There still remain the gallery round the dome to be done, and the gates, for which a new competition is about to be invited.

DONATELLO.

Among those who contributed greatly to the decoration of the cathedral was Donatello.

Donatello, whose real name was Donato di Niccolo di Betto Bardi, was born in Forence, in the year 1386. The first place among architects is given to Brunelleschi, as founder of the renaissance in Florence and as the originator of a new period of architecture by the construction of the dome of the cathedral, but Donatello and Lorenzo Ghiberti are placed among the first representatives of the art of sculpture. This is not the place to enumerate Donatello's works in order to give a clear idea of his greatness, but we can mention one or two of his best known productions. Of these his statue of David, which is on the west side of the clock tower, comes first; then there were statues of John the Baptist, the penitent Magdalen, etc. By order of the different guilds he produced his statue of St. Mark, which so delighted Michael Angelo, of St. Peter, and St. George, which latter belongs to Donatello's best works. Much of his work is to be found in Padua, where he spent several years in ornamenting the altar of the church of St. Antonio.

Donatello died December 15, 1466, and was buried near his friend Cosimo de Medici in San Lorenzo, in Florence. Donatello's place in the history of art and the greatness of his name are founded on the influence which he exerted on Italian art of his time. To him is due not only the honor of ripening Florentine art for the production of the greatness of Michael Angelo, but also of inspiring the art of Northern Italy with new life. Our engravings are from the *Illustrirte Zeitung*.

Planers.

Goodell & Waters, of Philadelphia, the well known manufacturers of woodworking machinery, have just issued a very complete catalogue of planers, which is fully illustrated and printed in the best manner. It embraces nearly thirty varieties of planers, suitable for all purposes, from the finest cabinet work to the heaviest timber dressing.

Among the machines illustrated and described are the following: Pedestal jointer, jointer or hand planer, panel, pony, and finishing planers, single and double surfacers, planer and matcher, single and double surfacers and matchers, woodwork planers and matchers, flooring machines, endless bed planer, endless bed single and double surfacers, endless bed double surfacer with jointer head attached, endless bed planer and matcher, and timber planer.

This is, undoubtedly, the most complete catalogue of planers ever issued. They are also prepared to furnish planing knives of any description, and give directions for ordering. With branch houses in Chicago and San Francisco, they are enabled to fill orders in any part of this country promptly, and we would advise any of our readers who may be in need of woodworking machinery to address them at 3031 Chestnut Street, Philadelphia, for one of their catalogues.

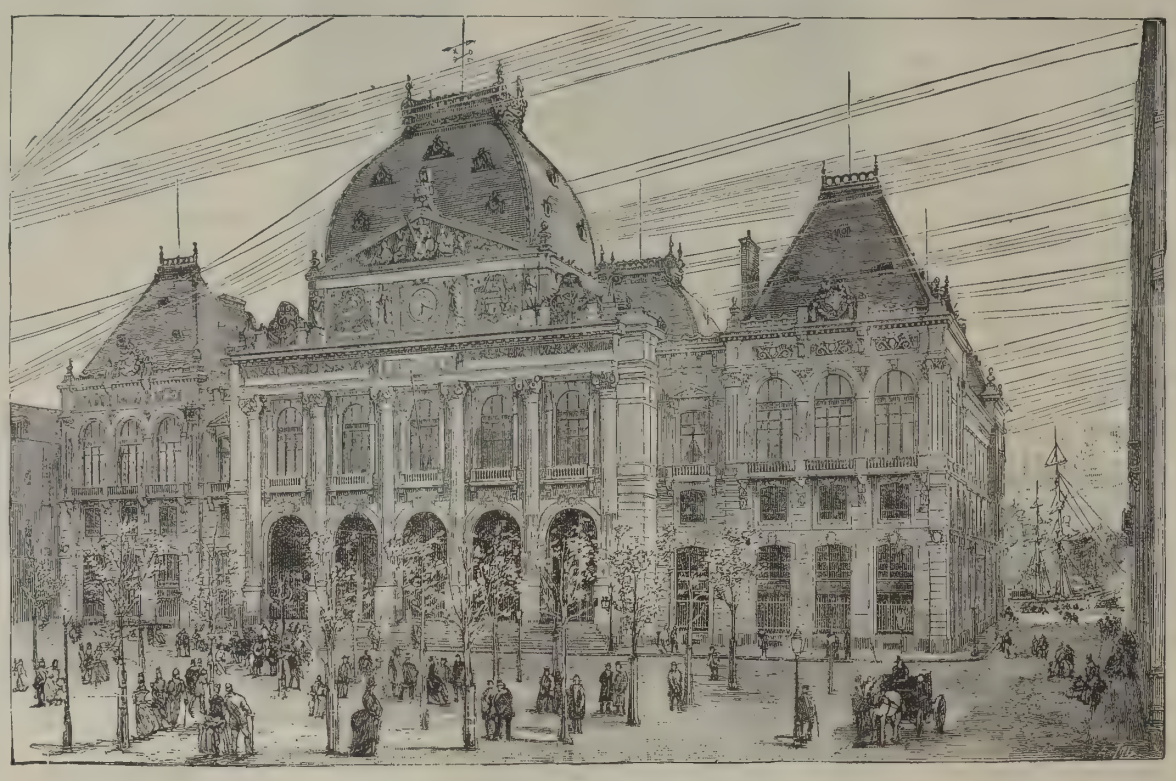
To remove candle grease from furniture without injuring the varnish, rub it off with a little warm water and a rag.

A RESIDENCE AT EAST ORANGE, N. J.

THE BOURSE AT HAVRE.

The active commercial city of Havre is at present enjoying the excitement of a great Maritime Exhibition. A large and splendid pavilion has been temporarily erected in the heart of the city, in which are collected almost every conceivable object pertaining to maritime industries. It is reported to be one of the finest and most interesting exhibitions of the kind ever realized.

We give an engraving of the Bourse or exchange at Havre, an imposing and elegant example of French architecture. The Maritime Exhibition is located not far from the Bourse.



THE BOURSE AT HAVRE, FRANCE.

IMPROVED CAMERA CLAMP AND TRIPOD HEAD.

The well known tripod screw for securing a camera firmly to the head of a tripod has many disadvantages, which have several times been pointed out, particularly when the camera is used in photographing architectural subjects. The object of the device shown in Figs. 1 and 2 of the engravings is to overcome the defects incident to the common screw clamp, by avoiding all separable parts and the wear of the screw thread, and at the same time to permit the camera to be easily and quickly secured to the tripod. A truncated cone shaped casting, having a projection provided with a socket or seat set flush with the top of the tripod head, is secured by screws to the under side of the head. The lower face of the casting is planed or filed off on a bevel. Passing through the hole drilled in its center is the fastening spindle, having a solid head turned on its upper end, and a thumb-actuated disk, held rigidly by suitable screws, at its lower end. The upper face of the disk is beveled to correspond with the bevel on the casting above.

Located in a slot in the spindle is a very light steel spring (see Fig. 2), which, in pressing against the walls of the hole, holds the spindle by friction, in any position, as it is elevated or depressed, and at the same time allows the spindle to be freely rotated. When the spindle is not secured to the camera, its head is drawn down into the seat in the upper face of the casting, so that nothing will project above the surface of the tripod head.

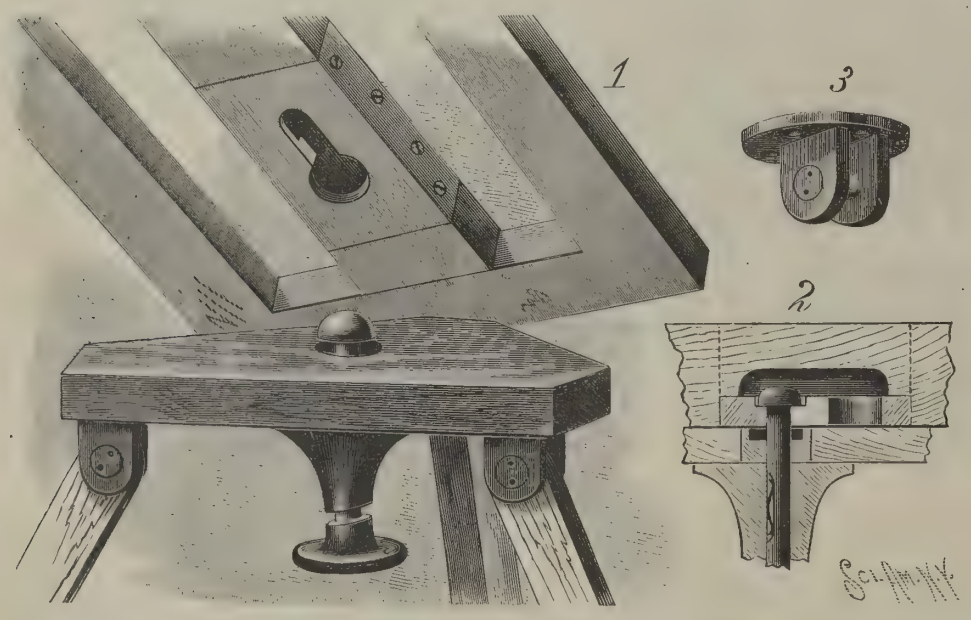
A light metal plate, having its ends bent up around the sides of the central bar of the camera bed frame and secured thereto by screws, as shown in Fig. 1, has a key hole slot in which the head of the spindle of the clamp fits. The wood of the camera bed is dug out back of this slot, forming a recess, as shown in Fig. 2. It will be noticed this method of fastening the plate to the camera bed frame secures unusual strength, since the pull on the screws is at right angles to their length. To prevent any possible slipping of the camera after it is secured, a slight depression is provided in the inner surface of the plate at the end opposite the entrance slot, clearly seen in Figs. 1 and 2.

To clamp the camera on the tripod head, it is only necessary to rotate the spindle by the thumb disk until the two beveled faces are parallel with each other, then to push the spindle upward until the faces meet, which leaves the spindle head projecting above the tripod head. When the camera is then set upon the tripod, the head of the spindle enters the key hole slot, and by a slight movement lengthwise the head is brought directly over the seat of the slot. By slightly rotating the spindle by the fingers with the thumb disk the beveled faces act upon each other like a cam, and at once draw down the spindle head into the seat of the key hole slot, firmly clamping the camera bed to the tripod head. A reverse movement allows the spindle to be pushed up, so that the camera may be quickly removed.

It will be observed that the clamp is very simple, effective, and strong, is, in fact, more durable than a screw, not liable to get out of order, and with it a camera can be very quickly adjusted to a tripod.

The inventor prefers the triangular form of a tripod head, made either of wood or vulcanized fiber, as shown in Fig. 1, and has the tripod legs rigidly secured thereto to avoid the wear and racking motion incident to detachable legs, which frequently occurs when photographing in a brisk wind. The fastening for the leg of the tripod is shown in Fig. 3, and consists of a round plate, provided with two projecting ears having a pin riveted between them, which passes through a hole in the extremity of the tripod leg. The plate is secured to the under side of the tripod head by screws. This construction makes a very rigid and steady bearing for the tripod head and camera. Both may be carried about on the shoulder without in any way straining the clamp.

Different sized cameras may be used on the one tripod head. The improved clamp may be fitted to any tripod head or camera. Further information may be had from the inventor, Mr. M. P. Warner, Holyoke, Mass., who is prepared to furnish the improved clamps and fit them to tripods.



WARNER'S CAMERA CLAMP AND TRIPOD HEAD.

JOINTS IN WOODWORK.

It would be an indubitable advantage in the construction of our buildings if framers and carpenters more generally understood the principles which govern the form of joints in woodwork. Many of the most important joints are commonly executed in a manner which is bad in workmanship and improper in form, and to prove the truth of this it will only be necessary to examine any of the less important of our buildings.

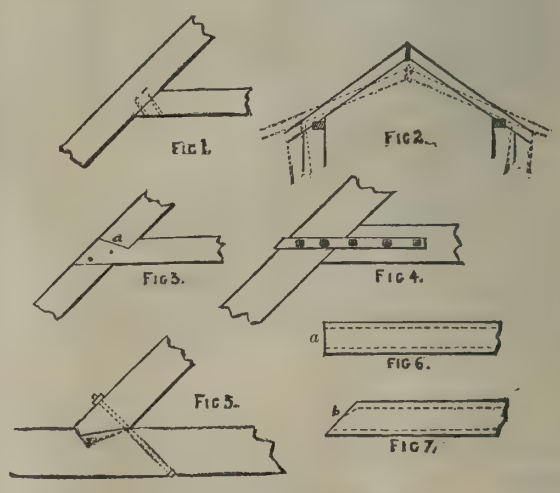
Professor Rankine, in his "Civil Engineering," and Tredgold, in his "Carpentry," have dealt with the subject of joints in a very comprehensive and thorough manner. The forms for various joints recommended by these authors are substantially the same, and are, to a considerable extent, followed in Europe. Here in America, joints in woodwork are generally executed in a much more crude and imperfect manner, even in the best work, where the form is, as a rule, simpler and less perfect.

The reason for this is not far to seek. In any country like this, where wood is abundant and labor expensive, the system of construction will be different from that used in countries where labor is comparatively cheap and timber dear. The effect will be to simplify the construction to a considerable extent, and to save labor in the execution so far as possible, even at the sacrifice of material. These conditions have had a considerable influence on the general forms of joints, with the result of producing a quantity of bad work. The question of the adoption of any particular form of wooden structure, which requires the use of more or less timber, with a corresponding loss or gain in the labor required upon it, will be simply determined by the local cost of labor and materials and the comparative loss or gain in the two items. But with joints the matter is different.

The strength of any structure must be as the strength of its weakest part, and in most wooden structures the joints necessarily form the weakest portions; so that if the strength of the joints is lessened by imperfect workmanship or improper form, the strength of the whole structure is thereby lessened in a corresponding degree. This has the effect of not only lowering the strength beyond safe limits, but of directly causing the absolute waste of a considerable quantity of material. For example: The members of an ordinary roof of some magnitude are usually much stronger than is actually required under normal conditions, the object being to provide for the effect of the pressure of high winds and for other emergencies which may arise. Some idea of the extent to which this is done may be obtained from the fact that, while it is usual to allow only 8 cwt. per square for the weight of slates and timbers, and much less for shingles and felting, as much as 36 cwt. per square is allowed as the probable wind pressure on the roof in times of gales and hurricanes.

Such emergencies are provided for by the use of timbers of sufficient size to resist such force, should it be applied. But if, in joining these timbers together, the connections are badly, carelessly, or improperly formed, the full strength of the timbers can never come into play at all; for if a very high wind take place, the joints will fail under the exertion of a force much less than the roof would safely carry with such timbers properly jointed.

In determining the form of a joint, it should be striven to produce a strength as near to that of the solid piece as is practicable. Rankine, in his work before referred to, lays down a number of rules upon which the form of a joint depends, and the reader interested in the subject will do well to refer thereto.



JOINTS IN WOODWORK.

For our present purpose we can consider that the following points chiefly determine such form: (1) The direction of the load; (2) the description of the load; and (3) the nature of the materials to be joined.

As characteristic examples we will consider two cases. In the first place, the joint used in connecting a collar to the rafter in a collar-beam roof. The description of strain here is important, as strictly determining the form of joint. Occasionally a carpenter is found

who is under the impression that as the effect of the weight on the roof is to cause the rafters to sag to some extent, the collar must be subjected to a direct compressive strain, and that the best joint is a butting one, as shown in Fig. 1. This is altogether wrong. The only possible condition under which the collar could be compressed is where the feet of the rafters are immovable, and even then (a condition impossible to produce in practice) the sagging, and consequently the pressure upon the collar, could not be more than would result from the very slight lengthening of the timber due to the elasticity of the material.

The strain to which any member of a roof truss or other simple structure is subjected may always be found by determining the manner in which such structure, if overloaded, would fail. Thus in the present case the effect of an overload would be to throw the rafters out, as shown by dotted lines in the case of a single pair of rafters in Fig. 2. The effect of a load, even that of the weight of the timber composing the roof, would be to *tend* to throw out the rafters in the same direction. The object of the collar, then, is to simply tie the two rafters together, and prevent them spreading out, and the collar is therefore clearly subjected to a tensile or pulling strain.

It is apparent that, such being the strain, the butting form of joint, before referred to and shown in Fig. 1, would be almost useless, and would in fact depend for its strength entirely upon the adhesion of the nails joining the two parts. Nevertheless, partly from ignorance, this joint is used, and very frequently, even where the strain is understood, to save labor the collar is simply nailed upon the side of the beams.

The proper form of this joint is that shown in Fig. 3, in which a portion, usually about one third of the depth, is cut away and the collar halved on and pinned in place. The inclined edge, *a*, prevents the piece from being withdrawn, and hence effectually resists the strain. Sometimes this joint is formed by fitting the collar on the rafter with a tenon, and connecting it with an iron strap, as shown in Fig. 4; but this construction is only employed in roofs of large span.

The form of joint, if such it can be called, shown in Fig. 1, although not infrequent, is a fair example of the manner in which timber may be wasted by bad construction, for the sake of saving a little labor. Can it be doubted that this is very far from true economy?

As an example of strains unlike those just referred to, we will take the case of the joint between the foot of the principal rafter and tie beam of a king post roof truss. There is the same tendency here for the rafters to separate as in the preceding case, and the effect is to throw the tie beam strongly into tension, and the strain on the joint will be a compressive one. The load being communicated to the tie beam by the rafter at an acute angle, a special provision is necessary in forming the joint. The most important point is to form the butting surfaces at right angles to the thrust, and this is provided for by letting the rafter into the tie beam, as shown in Fig. 6. Then, as there is some tendency for the rafter to slip out of its place, a tenon is provided, forming the joint usually termed the shouldered tenon, as shown in Fig. 5. There is a tendency, too, for the rafter to rise out of its place, and, to prevent this, a bolt is passed through the two, or in large trusses an iron strap is placed around, to embrace the two and keep them from separating. Other forms of this joint are sometimes employed, some having two tenons and others two bearing surfaces, but their use is limited. It is not necessary to illustrate here the various bad and ill considered forms of this joint in common use. The example in Fig. 5 is the simplest form which should be allowed, even in unimportant work.

In the proper construction of this joint, it is obviously important to place the end of the rafter far enough back from the end of the tie-beam to prevent detrusion or splitting off of the wood. Hurst gives the following rule for finding the distance: Let *a c* equal the required distance in inches; B equal breadth of tie beam in inches; H equal horizontal thrust in pounds; and S the cohesive strength of a square inch of the material.

$$\text{Then A. C.} = \frac{4H}{BS}.$$

The time occupied in the execution of this joint is, of course, somewhat long, but it is of so much importance (for the whole stability of the roof depends upon it) that the inferior forms so often seen, some without tenons at all, others without straps, would never be adopted by a good workman.

A consideration of the nature of the material to be jointed is of importance in determining the description of joint to be used. The most important characteristic, so far as the question of joints is concerned, is the manner in which it shrinks. It may be taken as a fact that any alteration in the length of a piece of timber by shrinkage is inappreciable, but the shrinkage in the direction of its width is considerable. This fact will have an important bearing on the form and execution of joints. If a piece of timber be cut off at the end at right angles, it will, on shrinking, still retain the same shape. If the end be cut at an angle, the effect of shrinkage will be to make the angle more acute. In other words, let the full lines in Figs. 6 and 7 represent pieces of timber cut at right angles and obliquely, respectively, as shown. When the timber shrinks to the position shown by dotted lines, the end *a* will be unaltered in shape, but still retain its end perpendicular with the body; while the end *b*, shrinking in the same manner, will be altered, becoming more acute, as shown by dotted lines in the figure. Framers should remember these facts, and make allowances for the alteration in shape, and especially when working upon timber unusually sappy.

When a joint is not quite true, it is usual to run a saw-cut between the abutments, to produce a better bearing; but as timber all shrinks to some extent, it is well not to make the abutments fit too closely at first, provided always that the inequality is properly allowed to be compensated by the subsequent alteration in form which will take place from the shrinkage, as explained.—*Artus, in the American Architect.*

RIVERSIDE AVENUE, SPOKANE FALLS.

The marvelous growth and development of the great West is well exemplified in the sketch we give, from the *Northwestern Architect*, of the substantial hotel and office buildings on Riverside Avenue, Spokane Falls, Washington Territory. Messrs. Joy & Fitzgerald, of St. Paul, Minn., were the architects.

WHEELER'S PATENT WOOD FILLER.

In the SCIENTIFIC AMERICAN of March 12 we mentioned another decision in favor of the Bridgeport Wood Finishing Co., further establishing their patent upon Wheeler's wood filler, rendered in the United States Circuit Court, Boston, Judge Colt entering a final decision in their suit *vs.* Asahel Wheeler in equity. This decree affirms the validity of the Wheeler patent, and restrains infringement thereof by the use of ground silex in wood fillers.

The various goods manufactured by this company have long been noted for their excellent qualities, and it gives us great satisfaction to know that we have largely assisted in introducing them to distant countries. Among many letters received by the manufacturers is the following:

OFFICE OF SUPT. OF WORKS, SIMLA IMPERIAL CIRCLE,
SIMLA, March 28, 1887.

BRIDGEPORT WOOD FINISHING CO., New Milford, Ct.:

SIRS: I learn from an advertisement in the SCIENTIFIC AMERICAN that you are the manufacturers of Wheeler's patent wood filler, an article I have heard praised. I shall feel much obliged by your sending me particulars of it, and any preparations for wood finishing that you manufacture. We shall shortly have a large quantity of woodwork to do in the interior fittings, furniture, and decorations of the new viceregal palace here, and I am anxious to learn of all labor saving processes and preparations that are in the market.

Our woods are chiefly teak, which is imported from Burma, walnut, box, took, and Himalaya oak, which grows in the neighborhood, besides the cedars and pine. You will also oblige by stating your agents or where your preparations may be obtained in the United Kingdom. I remain, sirs, yours faithfully,

L. M. ST. CLAIR,
Executive Engineer and Supt. of Works,
Simla Imperial Circle.

We congratulate the Bridgeport Wood Finishing Co. upon this letter, and have no doubt but they will receive the order, as their goods are well made and reliable. Their works are situated at New Milford, Conn., on the Housatonic Railroad, thirty-five miles north of Bridgeport. The raw material from which their products are principally made is found in the immediate vicinity of their mills. Their plant consists of silex mill, wood filler factory, paint factory, storage and packing warehouse, barrel factory, and japan and stain factory. All these buildings are located separate, so that in case of fire one will not endanger another.

Besides manufacturing the Wheeler's patent wood filler, they are also largely engaged in manufacturing silex and feldspar, producing it of various grades of fineness, from coarse grains to impalpable powder, and for various purposes, such as making porcelain, scouring soap, sandpaper, etc.

Among the other products are Breinig's lithogen silicate paint, and Breinig's lithogen primer, and Breinig's white japan, drier, wood dyes and stain, all of which are giving general satisfaction and are meeting with large sales.

Readers who are in need of any of these articles should address the Bridgeport Wood Finishing Co., New Milford, Conn, who will be pleased to send illustrated catalogue and full particulars upon application.

THE NEW FRONT OF THE DUOMO, FLORENCE.

[For description see page 9.]

A RESIDENCE AT FLATBUSH, N. Y.

We give beneath the floor plans and elevations of a very comfortable dwelling at Flatbush, N. Y., erected for Mr. Martin by H. L. Harris, architect, of this city. The cost of the house was $3,700. The general style of the building is substantial and pleasing.

Preventive for Dry Rot.

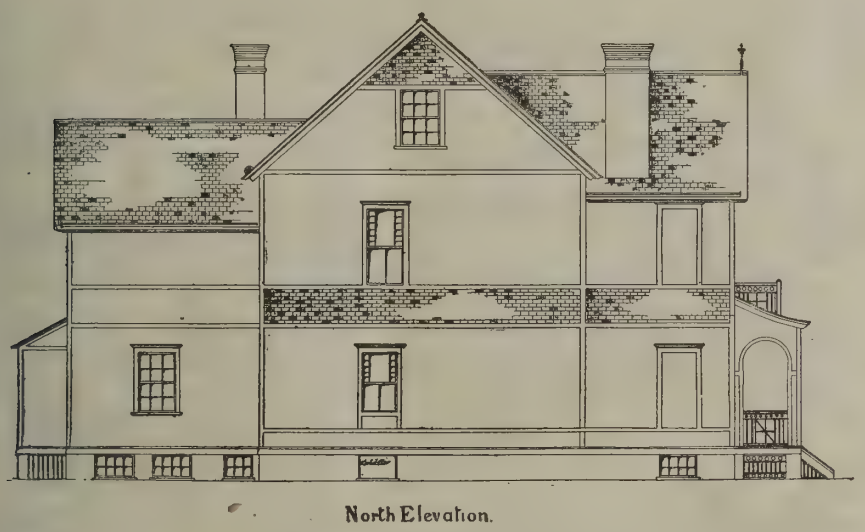
A Bohemian chemist has found that salicylic acid is a preventive and a cure for dry rot. At first the acid was used in the dry or powder form, but latterly the greatest success has been achieved, according to Prof. Farksky, by dissolving 5¼ ounces of salicylic acid in one quart of common spirit, and diluting this solution to a convenient degree with water at the moment of using it. In some of the old houses of Bohemia dry rot is a very dangerous thing, especially when it attacks the principal beams, which are mostly of beech wood.

Great California Dam.

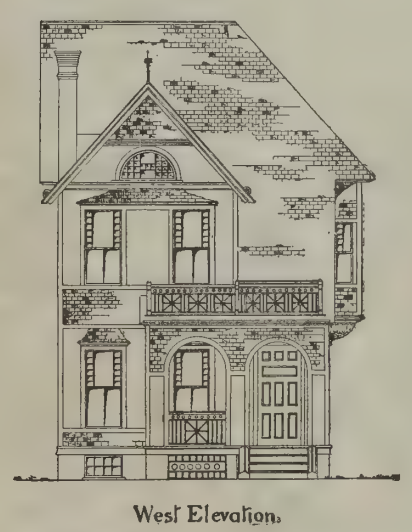
A remarkable dam is about to be constructed by a water company at the San Mateo Canyon, four miles from San Mateo, Cal., in order to form a reservoir. The canyon is very narrow and steep, and 15 ft. below the bottom is a solid rock on which the foundation of the dam will rest. The structure will be 170 ft. high, 175 ft. wide at base, 20 ft. at the top, and 700 ft. in length. It will be the largest stone dam ever known to have been built. The dike will have a curvature of eighty feet, and the convex side will be upstream. The material will be a new sort of concrete, composed of stones. The walls will be perfectly smooth. The reservoir that will be formed by it and the adjacent hills will be about eight miles in length and 150 ft. deep in the deepest places. Its capacity will be about 32,000,000,000 gallons. The water will be conveyed by tunnels to the city of San Francisco.—*Boston Journal.*

South Elevation

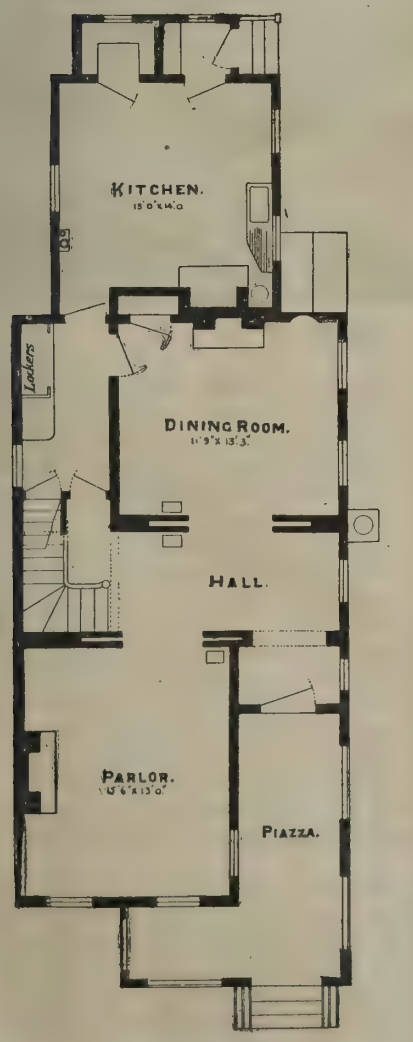
East Elevation.



North Elevation.

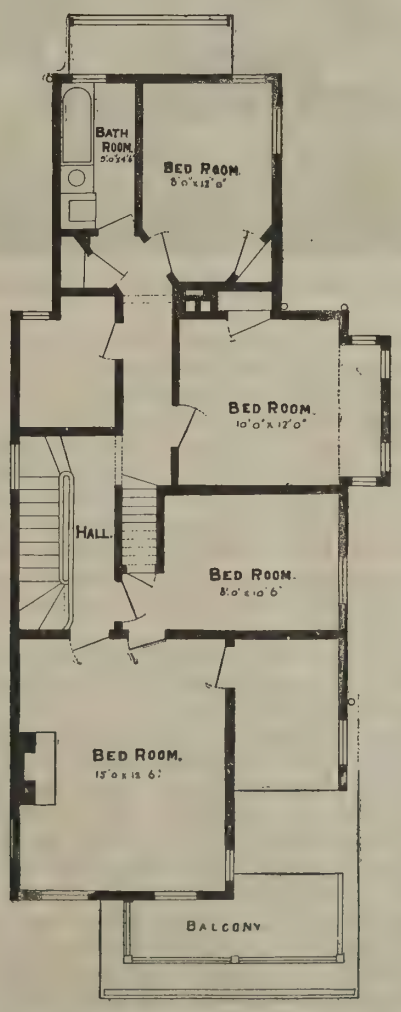


West Elevation.

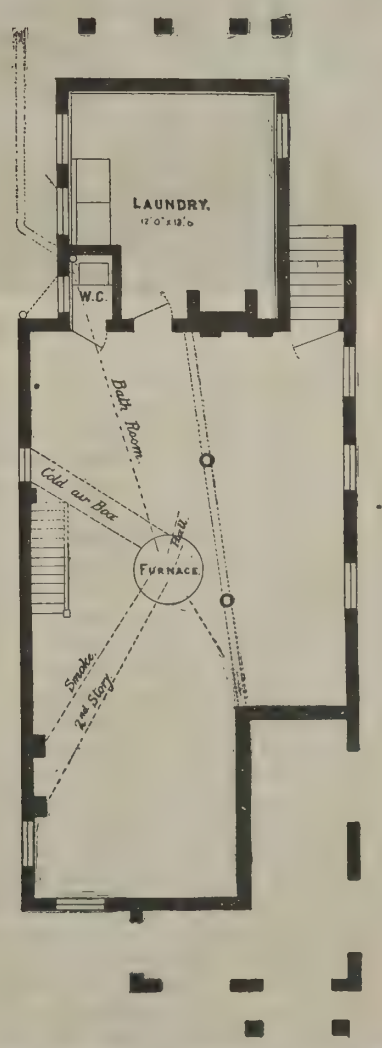


First Floor.

Scale of feet.



Second Floor.



Cellar.

A RESIDENCE AT FLATBUSH, N. Y.

THE MANCHESTER JUBILEE EXHIBITION.

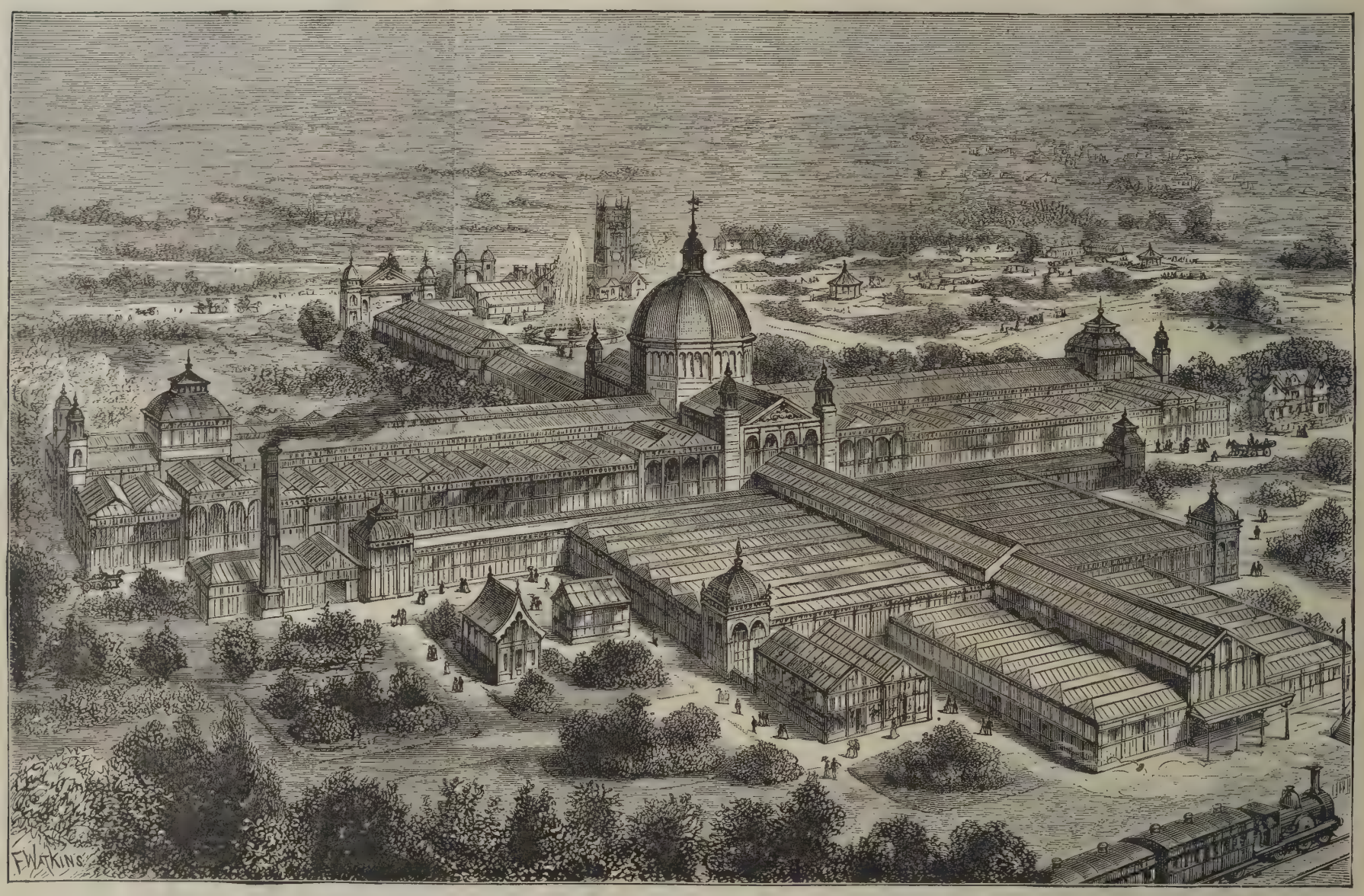
On May 3 last this exhibition was opened by their Royal Highnesses the Prince and Princess of Wales, under favorable auspices.

The *Engineer,* from which we take the following particulars, says: In many respects the exhibition is superior, not only in extent, but in variety, to anything that has been seen in England for several years. All the conditions are favorable to its success, for it possesses those elements of attraction which have been found so popular in London, inasmuch as it closely adjoins the botanic gardens, and as these will be thrown open to the visitors, it will be easy to provide open air attractions of no common order of merit.

The contents of the great machinery gallery fully maintain not only the reputation of Manchester, but of England. Never, since 1862, has anything like the display of textile machinery been seen within our shores.

The main building of the exhibition claims the special attention of all who are interested in iron structures. It is a remarkable example of the adaptation of means to an end.

The architects of the building are Messrs. Maxwell & Tuke.



THE MANCHESTER ROYAL JUBILEE EXHIBITION—GENERAL VIEW.

The principal building consists of a nave or main avenue, 1,000 ft. long, crossed at the middle point by transepts, surmounted by a graceful dome, which is finished above by a well proportioned lantern. Near to the ends of the nave are situated two pavilions, which rise to a considerable height above the nave roof, making with the dome a pleasing sky line, not usually found in exhibition buildings. The interior of the building when viewed from one end presents a very satisfactory vista. The nave has a total width of 100 ft., but as the sides are partitioned off to form rows for the display of furniture and other matters, the visible width of the main avenue is only 60 ft. The dome is 90 ft. in diameter, and is supported, as, indeed, is most of the roof covering, by slender clustered iron columns. The approach avenue from the royal entrance in Old Trafford road forms a most imposing corridor. It is 600 ft. long, and is covered in for its entire extent. There is a broad causeway down the center, and on each side there is a wide margin planted with exotic ferns, palms, and other foliage plants, which, as a whole, presents a feature that for luxuriance of vegetation is almost unique. This covered road is lighted after dark by electric arc lights, with excellent effect. Both north and south of the main building there is a vast covered area of ground, where the aim has been to afford protection for machinery and other exhibits, rather than to satisfy the eye by architectural effect. A special area of large extent has been devoted on the north side of the nave to the Irish section, which is well filled with exhibits of various kinds, some of which will be referred to in a future notice, but almost all of such a character as to show great excellence of workmanship and design. The large annex on the south side of the main building is almost wholly occupied by machinery at rest and in motion. This area is separated from the main building by Talbot road, across which is carried a foot bridge of 70 ft. span, which is used by all visitors arriving by rail at the exhibition station. In addition to the botanic gardens, there is a considerable area available for open air recreation. This ground is situated for the most part near Talbot road, and it contains detached buildings, notably a creamery, conservatories, billiard room, and smoking room. The proximity of the botanic gardens, as a matter of course, suggested the provision of all the accessories which made the fisheries and the other recent exhibitions at South Kensington so enjoyable as a summer resort. The grounds have been rearranged to a great extent. A wide promenade has been formed, with a band stand at each end, and, as we have said, a magnificent fountain has been provided for display with electric light.

The roofs of the exhibition building contain several features of a novel kind. The architects have shown considerable ingenuity in using those forms and sections of iron that are commonly found in the market. By doing so the delay consequent upon the adoption of special designs has been avoided, for with the exception of some small castings of a special form, every portion of the roof could be procured in any desired quantity. The adoption of the ordinary forms of iron has, of course, been attended with economy in two respects. The material was doubtless cheaper at first cost and if the building is to be taken down when its present purpose is served, the greater part of the material will be available for the purposes for which it was originally made.

The whole of the columns are built up of flanged pipes of 4 in interior diameter, having a thickness of ½ in. and flanges of ¾ in. faced. They are placed in groups of two, three, and four, and have a very light and elegant effect. Between the flanges are fixed cast iron zones, which are beaded round the edge, and as they project a little beyond the outer edge of the flange, they almost entirely conceal the fact that so utilitarian a material as a steam pipe has been employed. These zones have a further use in some situations, as they are then cast with a lug, to which is attached any tie or bracing that is required. Ordinary angle and T iron is largely used, and it will be seen by the drawings that hardly any smiths' work has been necessary. The labor has consisted almost entirely of shearing, punching, and riveting. The arrangement of the purlins is both simple and sound in construction. They are for the most part made of wrought iron water pipes screwed in the usual way at each end. These are passed through a purlin coupling of cast iron, and are fixed in position by nuts, which are tapped to fit the screw of the water pipe.

Most of the tie rods also are made of small iron water pipes, and these are attached at the ends in a simple but effective way. A piece of flat bar iron is punched with a hole in the center and a hole at each end. The bar is then bent twice at right angles, bringing the ends into proximity, so that any number of flat bars can be gripped and a bolt passed through the whole thickness. The end of the tubular tie rod is then passed through the center hole in the strap, and a nut is screwed on the end of the pipe, by which the whole can be drawn tightly together. It will be seen from the drawings that the suspending rods are also made of drawn tubes, and are attached to the tie rods by ordinary T pieces or junctions. The clustered columns are secured to the brick foundation by being bolted down to a cast iron bed plate of 1¼ in thick. The heads of the bolts are countersunk so as to insure a uniform bearing on the brickwork, and the bed plates are secured by holding down bolts, which are built into the brickwork.

In the roofs of the low main buildings, not only are all the members which are in tension made of drawn pipes, but the rafters and purlins are of the same class of material. The struts are of angle iron, and are attached to the purlin couplings by rivets. The shoes of the principals, and what answers for a ridge piece, are made of flat bar iron punched and formed to a suitable shape to receive the ends of the pipes, which are attached with nuts, as above described, for the tie rods. The dome, which is twelve sided in plan, is of graceful form, and is very light in construction Each rib is made up of two T irons, which are tied together by ordinary diagonal bracing of angle iron 2 in. × 2 in. × ⅜, each having a single rivet at each end. No pipes have been employed in this part of the structure, but the necessary ties are of steel wire rope, which is so light as to be hardly visible from the floor of the building. There are two complete sets of tire wires which cross the dome horizontally, but diagonally, as shown on the plan of the lantern, touching each other as they pass.

The buildings are, with very few exceptions, covered with corrugated iron, and no other material is used with it, except in the music room, at the eastern end of the building, where the inside of both roof and walls is lined with thin boarding, which, for obvious reasons, is more suitable than galvanized iron and ordinary brickwork.

The exhibition buildings are situated at some distance from the center of the city, but there are ample facilities provided for reaching it by both road and rail. The principal or, as it is called, the royal entrance is in Chester road, a few yards from the gates

of the botanic gardens. The exhibition is divided into two sections by Chester road, a thoroughfare 70 ft. wide. On the north side is the main building, on the south the great machinery hall, 510 ft. long and 210 ft. wide. This will be devoted to machinery in motion. Opening off it, still to the south, is an annex 180 ft. square for machinery at rest. The entire building is, as we have already stated, lighted by electricity. The contract for the whole of the arc lighting has been placed with the Anglo-American Brush Electric Light Corporation. The total number of lamps employed is 546, exclusive of those required for the private use of exhibitors. All the lamps are of the Brush standard pattern, working with a current of 10 amperes, and are maintained by twenty-six dynamos, inclusive of spare machines. The engines employed to drive the dynamos are by Messrs. Robey, Hornsby, Davey Paxman, Ruston Proctor, and Yates, and are arranged to suit the requirements of the several circuits as nearly as possible.

Our two sketches of the exhibition buildings are from the *Illustrated London News*, from which we also take the following:

A very interesting feature of this exhibition is the architectural reproduction of "Old Manchester and Salford," erected on the large lawn on the northern side of the botanical gardens, between the ordinary entrance to the gardens and the grand entrance to the exhibition in Chester road. The task of design was entrusted by the executive committee to Messrs. Alfred Darbyshire, F.I.B.A., and F. Bennett Smith, architects. From the set of drawings which they prepared, models in plaster were made by Mr. Hindshaw, and were colored by the architects for the guidance of the scenic artists. The general contract for the construction of buildings was taken by Messrs. R. Neill & Sons. All the lead lights and stained glass windows were provided free of charge by Messrs. Edmundson & Son. The committee secured the services of Mr. Walter Hann for the artistic painting. The result will be admired by all visitors to the exhibition. "Old Manchester" is entered through a Roman arch, flanked by two circular towers, presumed to represent the Porta Decumana of the ancient Mancunium, with a tablet bearing the names of the Emperor Domitian and of Agricola. The names of Roman legions and cohorts which garrisoned Mancunium are inscribed on the wall. Fine beech trees overhang this representation of historical antiquity. The interior contains faithful imitations of many old buildings that formerly existed in the town and suburbs; characteristic examples of domestic architecture in the Tudor period, in the seventeenth century, and in the early part of the Georgian era. Our sketches are those of Market Sted lane, with its timber framed houses, one of which—"The Palace"—was the lodging of the Young Pretender in 1745; the Cheetham College, which still remains; Hulme Hall, as the model is viewed from the gardens; and Ancoats Hall, with the tower of the old church, as seen together from the entrance by the Roman arch, of which also we give an illustration. The Prince of Wales during his sojourn was the guest of Lord Egerton, of Tatton Park. Fifteen miles south of Manchester, in Cheshire, is the quiet little town of Knutsford, to which there is a pleasant walk, from Altrincham, by the beautiful "mere" or small lake of Rostherne, and through Tatton Park. This rural part of the country presents an agreeable aspect of soft verdure with clear streams, unlike anything on the Lancashire side of Manchester. There are several noble parks, those of Dunham Massey, Tatton, and Tabley, adorned with clusters and avenues of fine trees, and inhabited by herds of deer. Tatton Park is the largest, being ten miles in circumference, and contains one or two meres, the grassy margins of which are refreshing to the eye. The mansion is a handsome building of white stone, with a Grecian portico, erected from Wyatt's design by Mr. Wilbraham Egerton. Its next owner, his son, was raised to the peerage in 1859, having been M.P. for a division of the county twenty-six years; he was also Lord Lieutenant of Cheshire. His lordship died in 1883, and was succeeded by his son, the Right Hon. Wilbraham Egerton, the second Lord Egerton of Tatton, who was born in 1832, and who likewise had sat in the House of Commons, for North Cheshire and Mid Cheshire, from 1858 until his accession to the barony; he is married to a daughter of the second Earl Amherst, but has no son; and his brother, the Hon. Alan de Tatton, is heir presumptive to the title. Tatton originally belonged to a family of that name, from whom it passed by marriages to the Masseys, the Stanleys, the Breretons, and to Sir Thomas Egerton, Lord Chancellor in the reign of James I., ancestor of the Earls and Dukes of Bridgewater, the Earls of Ellesmere, and the Egertons of Tatton.

From the *London Graphic* we take some illustrations of Tatton mansion, where the Prince and Princess of Wales sojourned during their stay in the vicinity of Manchester. The *Graphic* says: Tatton Park, the seat of Lord Egerton of Tatton, where the Prince of Wales has just been a guest, is situated about three miles from Knutsford and six from Altrincham, in the County of Cheshire. Although the surrounding country cannot be said to be particularly picturesque, yet the park, of some four thousand acres, is well diversified with hill and dale, and planted with fine groups of trees, some of which are evidently of considerable antiquity. There are, moreover, two large lakes and several ponds, which add greatly to its attractiveness.

The mansion is situated upon an eminence, from which the ground declines to the south. This decline was formerly covered by one of those monotonous sloping lawns so beloved of "Capability" Brown and other English landscape gardeners of the last century, but has just been cut into terraces and gardens by the present Lord Egerton. At the foot of this decline is a thick grove of yews, cypresses, and other evergreen trees, whose dark foliage forms a pleasing contrast to the white balustrades, urns, and fountains of the terraces. Beyond this grove most delightful gardens spread away to the banks of a charming lake with islands, rustic bridges, and a little temple erected in imitation of the Choragic monument at Athens. The late Sir John Paxton greatly improved this portion of the estate, and his genius for this kind of landscape gardening seems to have had a good opportunity of displaying itself here. There is a larger lake further away from the house toward the southern end of the park.

The mansion itself is for the most part—at least, externally—an erection of the elder Wyatt's, who built or rebuilt so many noblemen's houses during the reign of George III. It is of stone, and in the cold and formal, though dignified, classical style in vogue during the latter half of the last century. The south front has a Corinthian portico and plainly treated wings, forming its main features. A lower kind of wing, adorned with a double colonnade, stretches away to the west, and conceals externally portions of an earlier house dating from the time of Charles II. The north front of the house, also by Wyatt, must until recently have presented a somewhat dreary appearance, as it is unadorned with either portico or pilasters. It has, however, been greatly improved of late by the present Lord Egerton, who has added a forecourt, approached by large ornamental iron gates in the center, opposite to the chief entrance of the house, and two pedimented gateways at right angles to it, that to the left leading into the garden, and that to the right to the usual entrance of the house, the offices, etc. Beyond this gateway is seen the pretty apse and *flèche* of the new chapel, another of the additions by Lord Egerton. Entering the house through the principal doorway, one is admitted into a spacious hall subdivided into three parts by columns. This is really strikingly treated, and is the best work executed by Wyatt at Tatton. There appears to be distinct evidence that it was from Wyatt's designs, or one would feel inclined to doubt the matter. The inner hall, with the principal staircase, is also handsome, but the little side staircase, recently brought from the decayed old mansion at Hough's End, and re-erected here by Lord Egerton, is far more attractive to the artist. It is called Queen Elizabeth's staircase, because, when the old mansion at Hough's End was first erected, Queen Elizabeth honored it with a visit in recognition of some services which its proprietor had afforded in the way of collecting arms and supplies to resist the Spanish Armada.

Wyatt seems to have made such very extensive alterations at Tatton Park that nothing is now visible of the old mansion of Charles II.'s date except the dining room. This is, however, a good example of its style, with excellently carved panels, wreaths, and arabesques somewhat French in character. Of the more modern apartments, the library, which has been al

THE MANCHESTER ROYAL JUBILEE EXHIBITION—THE CENTRAL DOME.

most reconstructed by the present Lord Egerton, is the most elegant. The chapel, which is at present unfinished internally, will be very handsome.

The whole house is lit by electric light. A group of buildings, situated near the western wing, and consisting of conservatories, orchid house, aviary, and a large fernery, deserves to be noticed. The fernery is said to be the largest attached to any private house in the country, and is most beautifully laid out with paths, ornamental water works, rock work, and planted with superb examples of ferns of every description, with here and there a palm tree.

About half a mile from the present house, situated in the park, are the remains of old Tatton Hall. It appears to have been a fine old Gothic mansion of red brick, but has been very much curtailed as to its dimensions, and altered to convert it into three separate dwelling houses, so that, externally, there is little to give one any idea of its former magnificence. That it must, however, have been a grand old mansion is proved by the fact that in the loft over one of the houses are to be seen the remains of an early perpendicular roof of singular beauty and unusual span, which must evidently have formed a portion of the great hall of the house, and, from its remarkable elaboration and great size, suggests the idea of a very noble apartment. Unfortunately, a modern floor cuts it off some four feet below the wall plate, and, in order to convert the lower portions of this hall into dwelling rooms, every vestige except this roof is concealed from view. The roof would seem to date from about the time of Henry VI., and is certainly one of the most elaborate examples of domestic architecture of that period in existence. The old mansion is known to have been in use as late as the time of Elizabeth, and in all probability was so down to the erection of the present mansion in the time of Charles II.

Light violet with black trimmings is the new color of Mr. G. W. Childs' cottage at Long Branch.

Plumbing and Drainage.

The Common Council of Providence, R. I., has passed a bill regulating plumbing and drainage, as follows:

Section 1. The inspector of buildings shall inspect the drainage within the outside walls and the plumbing of all buildings hereafter erected in the city of Providence, except as herein otherwise provided.

Sec. 2. The Board of Public Works shall transmit to the inspector of buildings the names of all persons licensed to carry on the business of plumbing or drain laying, together with the location of their respective places of business, and notice of any change in the place of business of a licensed plumber or drain layer shall be immediately given to said inspector by said Board of Public Works.

Sec. 3. When any building is to be connected with a public sewer, the drain from the sewer to the point where it enters the cellar or passes above ground shall be inspected by the inspector appointed by the Board of Public Works.

Sec. 4. No work shall be done upon the drainage or plumbing of any building hereafter erected in the city of Providence, until plans fully showing the entire drainage and plumbing of the building shall be first filed in the office of the inspector of buildings, and be approved in writing by said inspector.

Sec. 5. Soil and waste pipes and their branches shall be of iron or lead. Wooden spouts or sheet metal pipes shall not be used for carrying sewage. All soil pipes and all waste pipes not connected with soil pipes shall be extended full bore above the roof without return bend, to such a height as the inspector of buildings may designate. When lead pipe is used for waste pipe, it shall not be lighter than the following weights per lineal foot, viz.: One and one-quarter inches, two and one-quarter pounds; one and one-half inches, two and one-half pounds; two inches, four pounds; three inches, five pounds; and four inches, eight pounds per lineal foot.

Sec. 6. All drain pipes when within a building and for five feet outside the foundation wall thereof shall be of iron, and connection shall be made with the sewer through drain pipes of iron, cement, or earthenware. Iron pipes shall be sound, and those above ground of a uniform thickness of not less than one-eighth of an inch for a diameter of four inches or less, of five thirty-seconds of an inch for a diameter of five or six inches, and with a proportional increase of thickness for greater diameters. Iron pipes under ground shall be of not less than the following weight per lineal foot, viz.: Two inches, five and one half pounds; three inches, nine and one-half pounds; four inches, thirteen pounds; five inches, seventeen pounds; six inches, twenty pounds, with a proportional increase of weight for greater diameters.

Sec. 7. Iron pipes, before being put in place, shall be coated inside and out with coal tar pitch, applied hot, or with paint, or with some equivalent substance. Joints shall be run with molten lead and thoroughly calked and made tight. Connections of lead pipes shall be made with brass ferrules, properly soldered and calked to the iron. In all iron and earthenware pipes, changes in direction shall be made with curved pipes, and connections with horizontal pipes shall be made with Y branches.

Sec. 8. Earthenware pipes shall be of the best glazed pipe, and all joints shall be made with Portland or hydraulic cement and sand mixed in equal quantities.

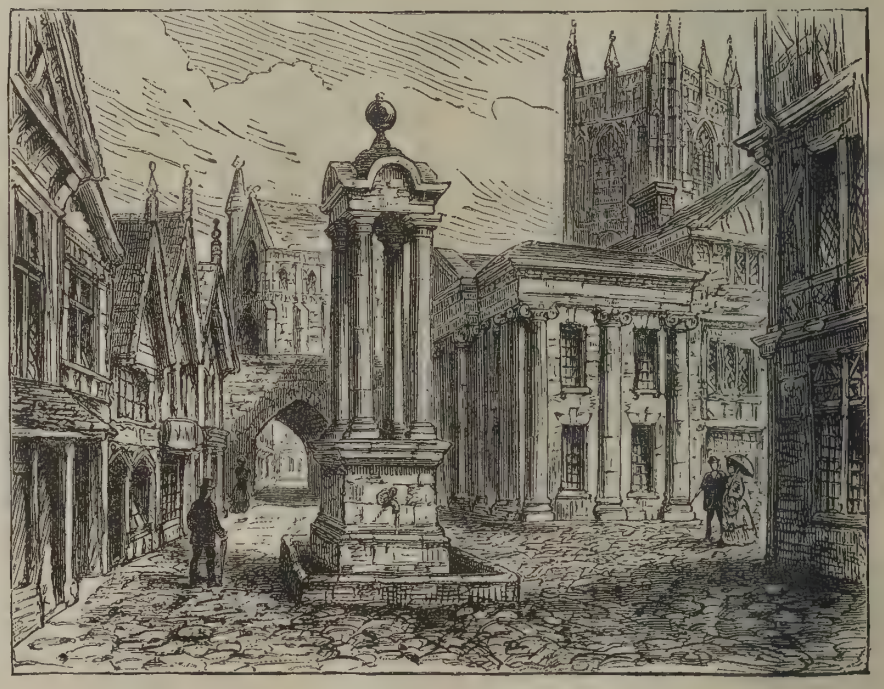
Sec. 9. Every drain shall be trapped with a running trap of the same size and material as the drain, and, if within a building, such trap shall be provided with a hand hole for convenience in cleaning. No connection shall be made with the drain on the street side of said trap. There shall be a fresh air inlet pipe entering the drain on the house side of and close to said trap, of a diameter of not less than three inches, leading to the outer air, and opening at any convenient place away from windows.

Sec. 10. The inclination of water closet, kitchen, and all other drains not over six inches in diameter, liable

HULME HALL.

ROMAN ARCH.

ANCOATS HALL, AND CHURCH TOWER.



MARKET-STED LANE.

SPECIMENS OF "OLD MANCHESTER AND SALFORD," FROM THE ARCHITECTURAL MODELS AT THE MANCHESTER EXHIBITION.

to receive solid substances, shall be not less than one-half an inch in two feet, and of cellar or other drains to receive water only, one-quarter of an inch in two feet.

SEC. 11. The inside of every drain pipe, after it is laid, shall be left smooth and perfectly clean throughout its entire length, and to insure the same a scraper of suitable material, of the shape of the pipe and slightly less in diameter, shall be drawn through each length of pipe after the same has been laid.

SEC. 12. The ends of all pipes not to be immediately connected with shall be securely stopped by brick and cement, or other water-tight and imperishable materials.

SEC. 13. All pipes that must be left open to drain cellars, areas, yards, or gardens shall be connected with suitable catch basins, the bottoms of which shall not be less than two and one-half feet below the bottom of the outlet pipe, the size, form, and construction of which are to be prescribed by the officer named in Section 3. When meat packing houses, slaughter houses, lard rendering establishments, hotels, or eating houses are connected with the sewers, the dimensions of the catch basins shall be required to be of a size according to the circumstances of the case. When the end of the drain pipe is connected with a temporary wooden catch basin for draining foundations during the erection of buildings, the drain layer shall be held responsible for dirt or sand getting into the drain or sewer from such temporary catch basin.

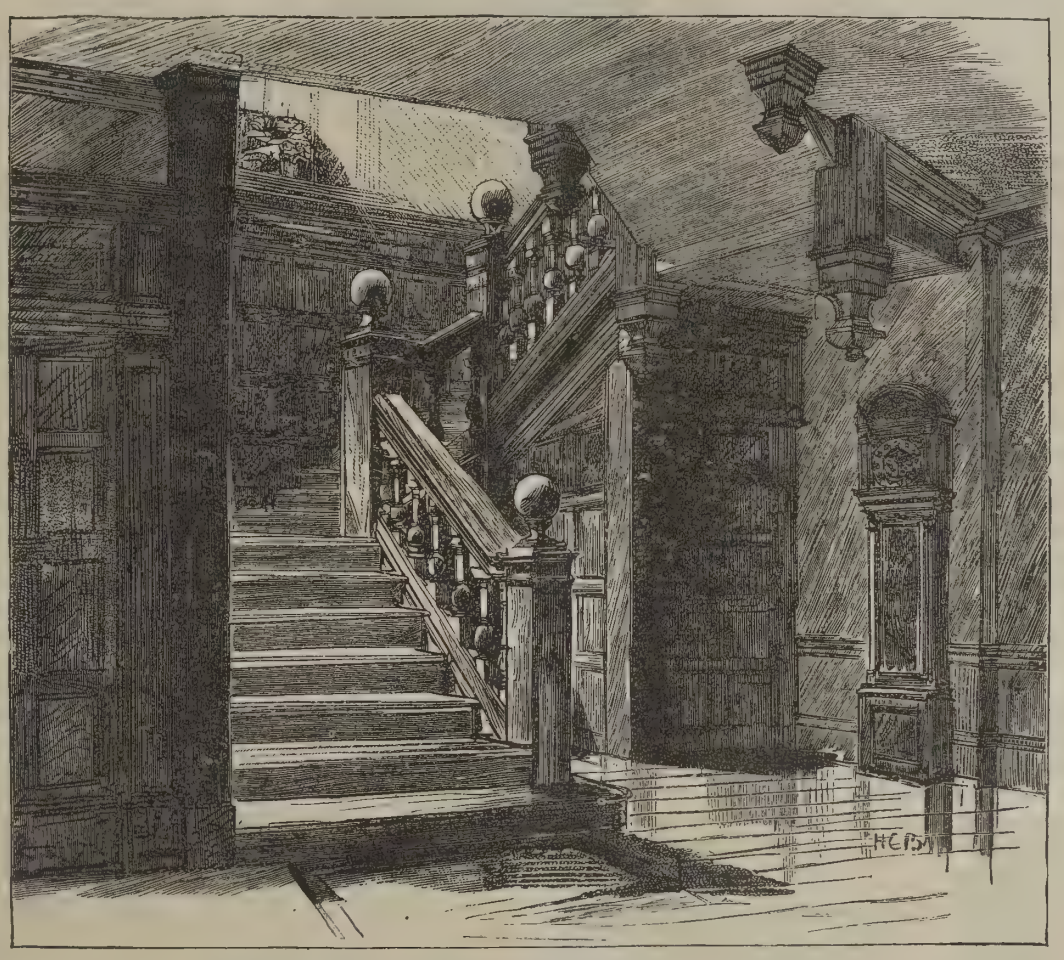
SEC. 14. All exhausts from steam engines, and all blow offs from steam boilers, shall be first connected with a catch basin of such dimensions as the officer mentioned in Section 3 may prescribe, and in no case shall they be allowed to connect directly with the private or public sewers, without special permission from the board of public works.

SEC. 15. Sewer, soil pipe, or waste pipe ventilators within a building shall not be constructed of brick, sheet metal, or earthern ware.

SEC. 16. Rain water leaders connecting with drain or soil pipes, and opening near windows, shall be trapped, and when placed inside of buildings shall be of iron, with joints calked with molten lead.

SEC. 17. Every wash basin, bath tub, sink, urinal, water closet, or other fixture shall be separately trapped as close to the fixture as possible. Water sealing traps of any pattern may be used when separate air pipe connections from the top of the same are provided; where separate air pipe connections are not provided, traps which will not unseal shall be used, such traps to be first approved by the inspector of buildings.

THE DINING ROOM, TATTON.



QUEEN ELIZABETH'S STAIRCASE AT TATTON.

SEC. 18. When separate air pipe connections are provided for back airing traps, they shall be of a size not less than the waste pipe; but air pipes for water closet traps shall be of not less than two inch bore for thirty feet or less, and of not less than three inch bore for more than thirty feet. Air pipes shall be of not less than two inch bore where they pass through the roof. Two or more air pipes may be connected together, or air pipes may be connected with a soil pipe; but in every case of connection with a soil pipe such connection shall be above the upper fixture of the building.

SEC. 19. Drip or overflow pipes from the safes under water closets and other fixtures, or from tanks or cisterns, shall be run to some place in open sight, and in no case shall any such pipe be connected directly with a drain, waste pipe, or soil pipe.

SEC. 20. No waste pipe from any refrigerator, or other receptacle in which provisions are stored, shall discharge into the soil of any cellar bottom, or into the soil beneath any floor of any building; all connections of such waste pipes, with a drain, soil pipes, or other waste pipes, shall be provided with traps suitably ventilated, and in every case where such connections are made there shall be an open tray between the trap and the refrigerator.

SEC. 21. Drains, pipes, and other fixtures shall not be covered or concealed from view until after the work has been examined by the authorized inspector, who shall be notified by the drain layer or plumber when the work is sufficiently advanced for inspection.

SEC. 22. Plumbing work shall not be used unless the same has first been tested, at the expense of the plumber, by the authorized inspector, with the peppermint, ether, or smoke test, and by him found satisfactory.

SEC. 23. No privy vault or cesspool shall be built upon any premises situated upon any street where there is a public sewer.

SEC. 24. Every cesspool shall be built of stone or brick, and provided with an iron cover which can be readily removed, so that the contents may be inspected.

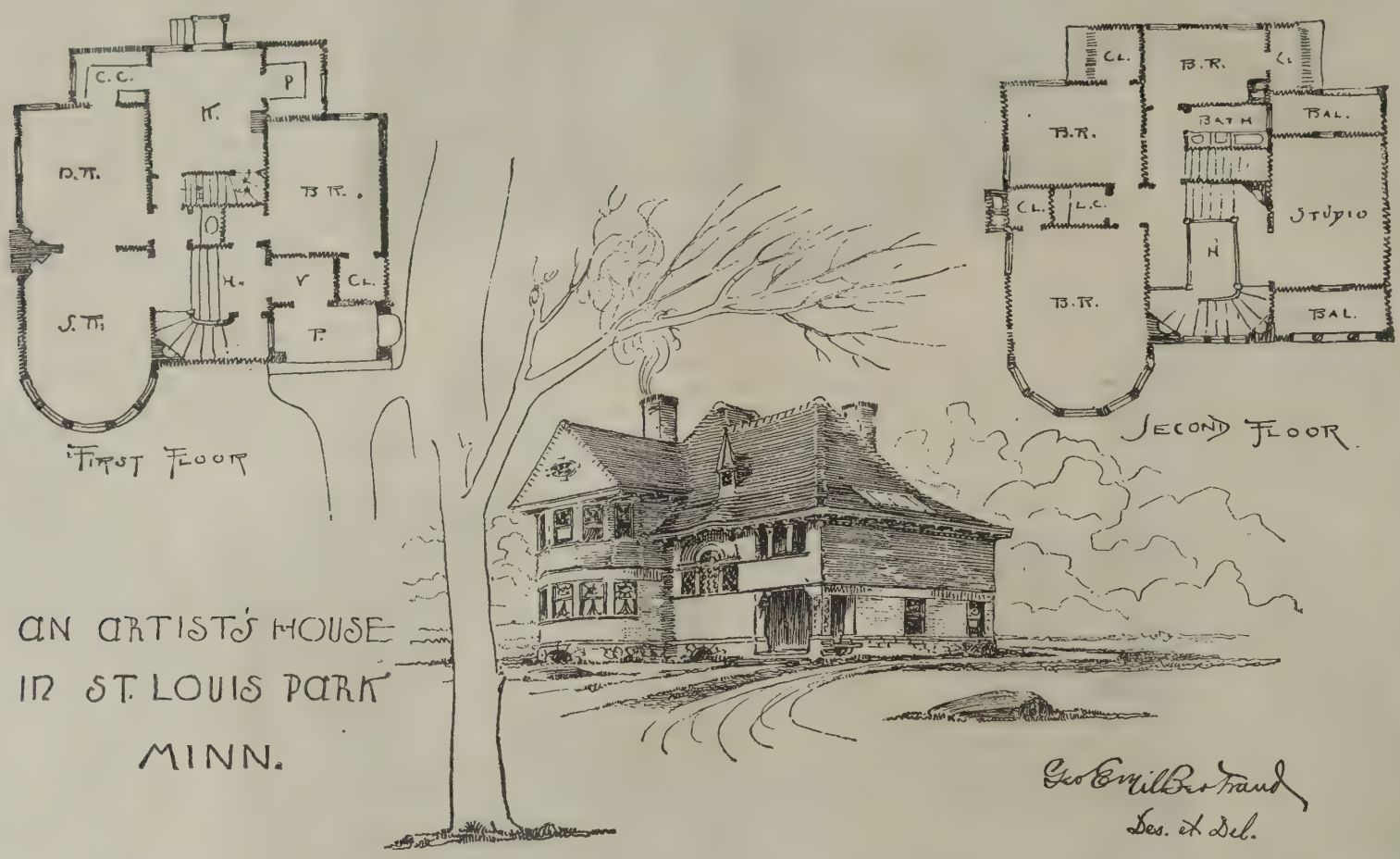
SEC. 25. No privy vault shall be connected with a public sewer. Vaults of privies shall be built of brick or stone laid in cement, and shall be cemented so as to be water-tight, and shall be so constructed that no surface water can find access to them. Every such vault shall have convenient approaches for opening and cleaning, and such approaches shall be properly covered. No privy vault shall be built within ten feet of a dwelling house.

SEC. 26. The authorized inspector shall promptly

TATTON, CHESHIRE.

condemn and order the removal of any defective materials, or any work done other than in accordance with the provisions contained in the foregoing sections, and the contractor putting in such defective materials or shall have done such work, or the owner of the building, shall, upon receipt of such order, remove such defective materials and any work so ordered.

Sec. 27. Every person who violates any of the regulations contained in this ordinance shall be fined not more than $50.



AN ARTIST'S HOUSE.

Our sketch, which is in the nature of a suggestion, shows an artist's house in St. Louis Park, Minneapolis, Geo. E. Bertrand, architect, of that city. Such a house may built for about $5,500. We are indebted for our sketch to the *N. W. Architect.*

VARYING MITERS.

In the ordinary routine of work pertaining to each of the different woodworking crafts, there are certain forms of joints, cuts, or important details of construction and decoration which are well known and occur almost daily, and other forms of the same which are varying. As those which are most in use are more easily worked and familiar to the operator, so it must of necessity follow that unusual forms will call forth more labor of brain and manual skill to effect their successful completion. This is particularly applicable in the case of the miter joint, which every woodworker is in daily contact with. It is being continually employed in different parts of joinery, in all places where a continuous grain or moulding is required, but the most difficult of all its employments to execute is the mitering of mouldings, both flush and raised, in framing. Here the intersection of the profile, especially those with many members, necessitates great care in marking the miter box and sawing it, marking and sawing the moulding, and in suring its perfect intersection before driving the pieces to their permanent place in the panel. Concerning a simple square miter of the angle of 45°, as it is too well known to require special comment here, we will avoid its consideration, except to recommend readers to take careful heed of three important points, essential to perfect mitering :

First.—To mark the miter box by a bevel set to the diagonal of a square about 4 in. wide, laid down with a knife on a clean board

Second.—To mark the box also with the knife and saw, carefully, keeping the saw kerf to one side of the knife mark.

Third.—Saw moulding exactly to the mark made on the panel, and out of one continuous piece for each panel, round the sides, and intersect perfectly before driving down.

Care and exactness will help to perfection and save trimming off afterward.

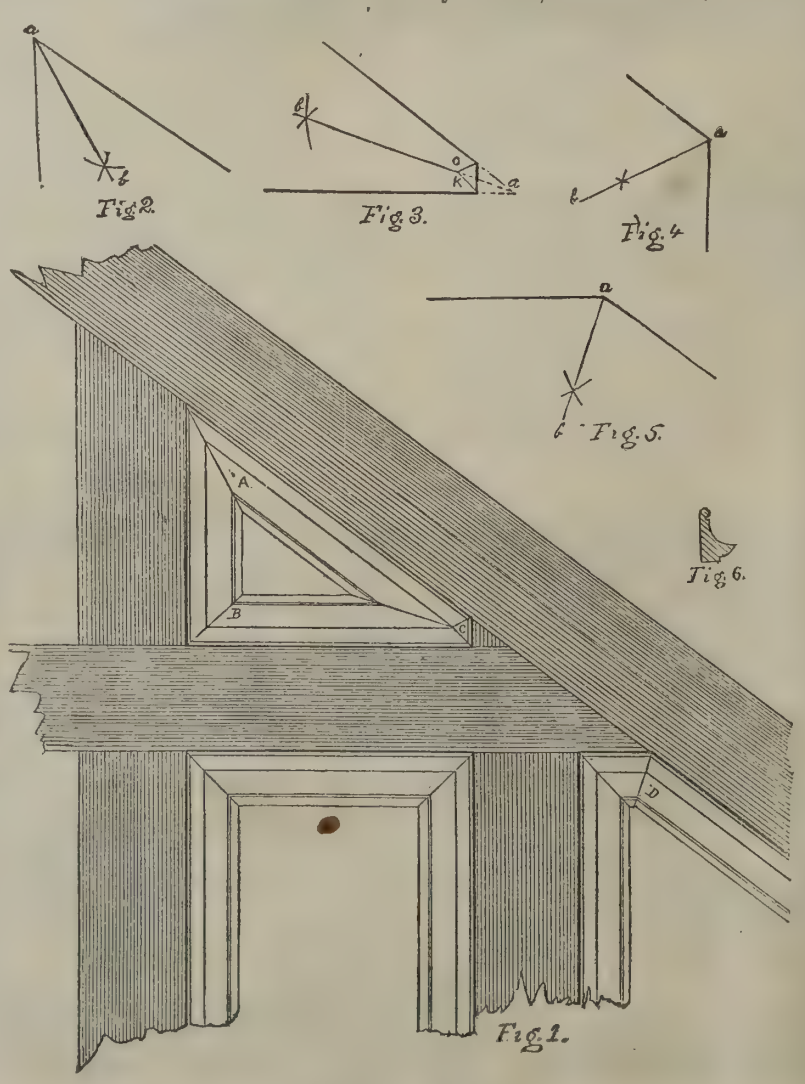
Fig. 1 represents a piece of ash paneling, designed to stand under a stair string. It embraces four miters of different angles, one of which involves in itself three separate intersections. By referring to Fig. 1, it will be seen that the angle A is less than the angle of 45° at B, and being thus acute or less, the moulding will form a longer intersection or miter than B. Similarly, the angle at D is greater than B, consequently the miter is shorter, which is plainly seen in the sketch.

To find the miter at A, strike out the angle inside the framing at A, like Fig. 2. Take any two points equidistant from *a*, Fig. 2, the apex of the angle. With the compasses, strike the crossed lines shown and draw a line joining their crossing with the apex of the angle. This line will be the exact miter, and if a bevel be set to it and marked on a good box, the cut can be got direct from the saw.

Fig. 3 shows the compound miter at C. It is rendered compound by the insertion of a small piece necessary to continue up the mullion below the rail shown, and the miters are found thus. The angle at the corner of the rail and raked piece, being even less than at *a b*, will be longer, and this line is gained by the method used above. B being a right angle, the miter for it is cut in an ordinary 45° box, but *o* must be cut to the line *a b*, shown at Fig. 4, which is the miter for the upper corner at C. These two cuts will give the small piece, its length being obtained on the small piece of mullion.

It will be noticed that the point of intersection of the three combined miters is at the apex or junction of the two main curves of the moulding represented at Fig. 6. The great length of the principal miter in this corner rendering it unhandy for a box, it is recommended that the moulding be marked on the bottom side and the miter cut square to the bottom to insure a close joint above. This method will always be found suitable for very long cuts. The fifth miter, shown in Fig. 1 at D, is obtained by the same process as before, and, being short, can be marked on (Fig. 5) and cut in the miter box.

Finally, experience has taught that the only way to obtain a perfect miter is from the saw alone, as it is invariably the case, no matter how carefully the block plane is used, the joint can never be evenly surfaced or satisfaction gained.—*By Owen B. Maginnis, in the Journal of Progress, Philadelphia.*



VARYING MITERS.

Wire Fences.

When barbed wire first came forward as a competitor with four and six inch strips as a material out of which to construct fences, it was feared that the demand for this particular kind and grade of lumber would so far decline as to leave it somewhat of a drug in the market. This was some years ago, and since that time perhaps even more than was apprehended respecting the increasing use of wire has come to be true. It is impossible to even estimate the miles upon miles of this almost invisible but efficacious material that has been bought and used in fencing Western lands. It has met with disfavor in many quarters, but despite all that has steadily made its way, the supreme recommendation of cheapness proving invincible. It is the old story of the cheaper driving out the dearer material, that is bound to be told of every case in which they come in conflict — *Timberman.*

A Blacksmith's Epitaph.

Carisbrooke Church, said to be founded 1064, has been partially restored, says the *British Architect.* It is beautifully situated, surrounded by a fine old churchyard, adjoining the "Priory Farm House," the site of the priory attached to the old church. There are a few monuments and a pulpit, dated 1658. The tower contains eight bells. There is some fine, bold carving on the pinnacles, and the view from the tower is magnificent. There are some curious stones in the churchyard. A slab over the grave of a farrier has the following lines :

"My sledge and hammer lie reclined.
My bellows, too, have lost their wind ;
My fire's extinct, my forge decay'd,
My vice all in the dust is laid ;
My coal is spent, my iron gone,
My last nail's driven, my work is done."

M. Ruprich-Robert.

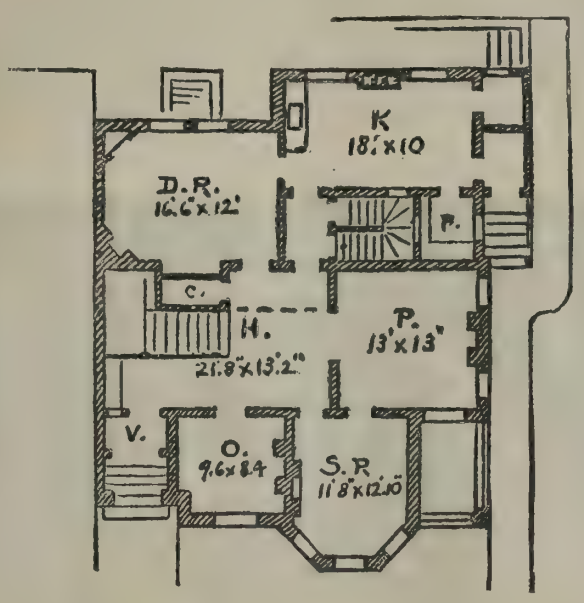
The death is announced of M. Ruprich-Robert, who held a distinguished place in the ranks of French architects. In *La Construction Moderne*, M. Maurice du Seigneur gives the following account of his life and works:

French art has sustained a great and veritable loss, for he who has just died was not only a master in the full sense of the word, but also one of those rare spirits who seem to be the guardians of the primitive forms of our national architecture, a scholar who was conscientious and precise, fascinated with the study of the past and careful of the independence of artists in the future. Ruprich-Robert belonged to that valiant school who defended mediævalism against the stupid attacks of routine and conventionalism. Like Viollet-le-Duc, he was one of the most vigilant and sagacious of the restorers of the monuments which were termed Gothic by the successors of the famous Petit-Raidel, the imaginative architect, who proposed to transform the pillars of churches of the fourteenth and fifteenth centuries into Doric columns resembling those of Pæstum. It must be said, however, that if Ruprich-Robert preferred mediæval art, it would be unjust to fail in recognizing his respect for the works of antiquity and for the works of a later time which were inspired by them. With so vast and honest an intelligence, he was perfectly able to comprehend the gracious adaptations of the Renaissance, as seen in the pomp of the seventeenth century and the caprice of the eighteenth. His protests and disdain were reserved for the immaturity and want of equilibrium of the present. His apprehensions, which were expressed with energy, were excited by the menacing apparition of that official art which is sure to lead to the banalities of academicism of the official sort.

In appearance Ruprich-Robert resembled one of those respectable and austere figures of apostles that are seen under canopies in the doorways of churches; and as they seem to smile at the young birds who build amid the sculpture of the tympanum, so he regarded with affection the students who were to be the architects of the future. His opposition on the subject of official diplomas must not be misunderstood. He was the first to recognize how much had to be gone through before gaining one of them, and also the talent and capacity of the competitors, but he feared that the diploma would lead to the supremacy of mediocrity in art, of which he was always an opponent.

Victor Marie Charles Ruprich-Robert was born in Paris, on Feb. 18, 1820. At sixteen he entered the *atelier* of Constant Dufeux, and, during the five years he remained in the Ecole des Beaux Arts, was recognized as studious and capable. He became attached to the Commission of Historic Monuments in 1844, and exhibited for the first time in the Salon, the subject of his drawings being the Templars' Church at St. Gaudens, which dates from the twelfth century. They were for the commission, and were followed by others which were also intended to be deposited among the archives. In the Salon of 1847 he exhibited drawings of St. Nicholas, Caen; in 1849, the church of St. Luke, Calvados, and the doorway of the church of Seez. He sent also a design for a sepulchral monument. A second class medal was awarded to him at the International Exhibition of 1855 for the drawings already mentioned, which were re exhibited with others of St. Sauveur, Dinan, and a project for the restoration of the Abbaye aux Dames, Caen. Afterward he was appointed professor in the special school of design and mathematics in the Rue de l'Ecole de Medicine. There he delivered a remarkable course on the history and composition of ornament, in which he developed the principles of his well known book, "La Flore Ornamentale."

In 1878 he was appointed inspector general of historic monuments. The work which has made his name most prominent is the "Flore Ornamentale," a folio volume with 152 plates. He also wrote about the influence of public opinion on the conservation of ancient monuments, and about the "Arenes de Lutece." The most important of his books is known as "L'Architecture Normande aux XIe et XIIe Siecles en Normandie et en Angleterre." It is the result of thirty years of study and observation, and exhibits in a new light the success of the art on both sides of the Channel. It contains 170 engraved plates, historic and descriptive letterpress, illustrated by about 200 designs. The last months of the life



of M. Ruprich-Robert were employed on the completion of this work, which is a veritable historic monument.

It was in Cannes on May 7, at half-past six in the morning, that he expired. He left three sons, one of whom, M. Gabriel Ruprich-Robert, was the faithful and intelligent auxiliary of his father, and who will, no doubt, as an architect uphold the credit of his name. His father's work and life may be summed up in two words—"Science and Conscience."

A CITY RESIDENCE, CHICAGO.

We give, from the *Building Budget*, the sketch of a city residence for Mr. A. B. Lawton, Superior Street, near St. Clair, Chicago. A substantial and pleasing structure, which reflects credit on the architects, Messrs. Patton & Fisher. The house is of stone, the cornice and upper part of the tower of copper. The size 38×48 ft., and the cost sixteen thousand dollars.

A CITY RESIDENCE CHICAGO.

PETRIFIED lobster, clams, turtles, and the like are found in great abundance in the Santa Catalina Mountains in Arizona, at a height of neariy 10,000 feet above the level of the sea.

Home Interiors.

In furnishing, one must consider, first, the uses to which articles will be put; second, the amount to be expended; and, above all, the real comfort to be secured from possession of, possibly, "high art furnishing." Do not sacrifice comfort to artistic desires, for true artistic designs are comfortable, and proper outlines are the groundwork; while details of beauty are made subservient to practical uses. High art nonsense is fast passing out of sight as art is developed in so many channels of practical usefulness.

Fancy gilt chairs with spindle legs are put in dark corners, allowed at times to hold one's fan, a stuffed dog, owl, or alligator, but the true art chairs have solid frames, careful filling and covering. They are beautiful from the fact that they are supremely comfortable. Sofa, divan, and floor cushions are large, comfortable, and softly rounded, full of carefully prepared material which produces a perfectly rounded outline and graceful form.

Cheap art furniture has had its day. Ungainly chairs into which one must climb, wretched sofas so full of art features that one almost despaired of life if obliged to use them continually—these have almost disappeared, for poor people have found out that the wretched affairs are only a delusion, and that the time spent in keeping them together would earn a better outfit. Home interiors gain beauty from the grouping of needful articles, the pleasant articles which make the inmates feel that home is the best place in the world, and that here there is room for every fancy. The book lover has a table that will hold his student lamp and all his needful books, the artist member has a corner with good light for the easel, while the piano has its own cozy chair and adjustable music rack. Baby has her own little rattan rocker, bright with bows of ribbon, and grandmamma looks picturesque in a huge rattan rocker, whose soft cushions are of plush or cretonne, to suit the season.

It is the touch of beauty upon needful articles, not the introduction of art features, which really makes the interior furnishing artistic and lasting in beauty. What shall we offer in place of tidies? some one asks. A proper tidy was made of lace and ribbon. This dainty creation followed the generous covers our great-grandmothers used to protect furniture. To-day we have returned to furniture covers, and the tidy, useless, tormenting, and never appropriate to its use, has given place to covers of silk or linen. One of the most picturesque affairs is of pongee or wash silk. Take a length of one yard and a half, finish the edges with blind stitches or feather stitching, and finish the ends with tiny tassels of silk, which come already to put on. Knot the silk into a loose sailor knot or bow of any kind, and put it on the chair with fancy tidy pins. A square backed lounging chair can have a square cover of linen or silk, cut to fit over the chair back, falling short at the back, long in front; sew the sides strongly and draw over the chair back, covering top only. Embroidery in wash silk will make this addition fanciful as one could wish, and your pretty trifle cannot get away, will wash, and still be beautiful.—*American Art.*

Pa Crusta.

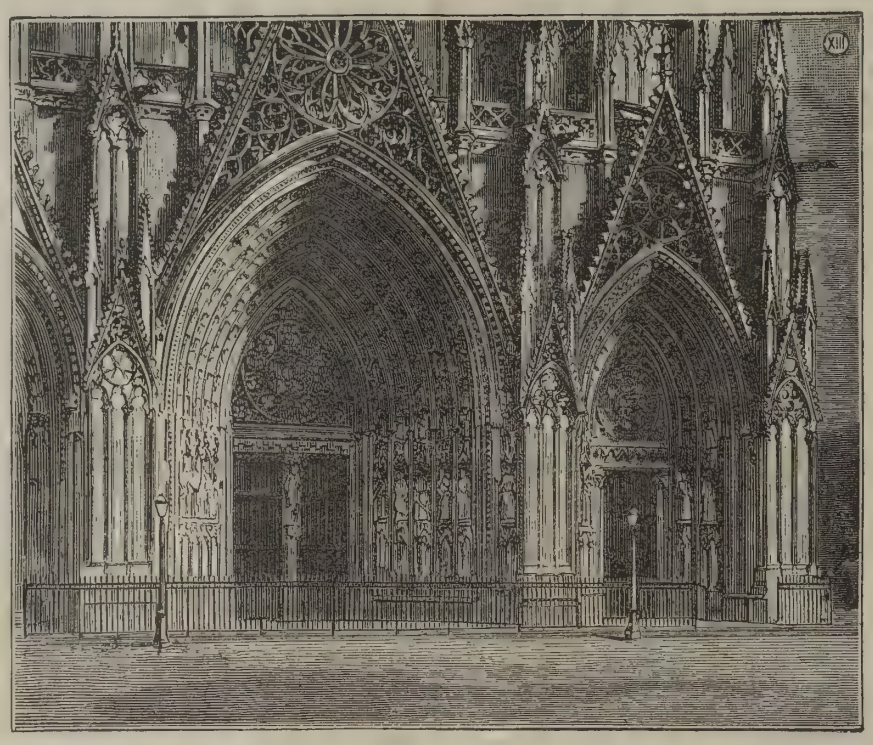
A new style of interior decoration has just been introduced in Minneapolis, the first work of the kind having been put up on the walls of Mr. Legg's jewelry rooms, which opened May 1. The new invention is known as Pa Crusta. It is simply different grades of paper soaked in glue water and formed into various shapes by the hand of the workman as he places it on the wall, where it hardens and is then decorated by the painter. While it is cheaper than lincrusta or stucco, it is far handsomer, and no two walls are ever decorated alike. In the hands of competent men, there seems no limit to the variety and styles and practically none to the beautiful effects to be obtained. It is equally adapted to the elaborate decoration in public places and to the simplest forms of ornamentation required in the houses of those who are able to bear the cost of stucco and the like.—*N. W. Architect.*

GEMS FROM ROUEN.

We give a few illustrations of memorable buildings in Rouen, France, for which we are indebted to *Le Monde Illustre*. First is the ancient pile known as the Hotel Bourgtheroulde. Next a front of the famous cathedral of Notre Dame. This wonderful structure dates from the thirteenth and sixteenth centuries. It is 434 ft. long and 103 ft. broad, with transepts 174 ft. long. The nave is 89 ft. high. The ornamentation of the front is superb. Its three grand portals are flanked by lofty towers. The central tower, which stands at the intersection of the nave and transept, is surmounted by an iron spire 470 ft. high. The interior decorations are elaborate and profuse. There are 130 windows. The church contains many tombs of celebrated worthies, among them that of Richard Cœur de Leon.

Another of our illustrations is that of the portal of the abbey church of St. Ouen, a magnificent structure. This church is regarded as one of the most perfect examples of Gothic architecture in the world. It has a tower 260 ft. high, composed of open arches and tracery, and terminating in a crown of *fleurs de lis*.

The city of Rouen has a splendid library of 120,000 volumes, an academy of science, a museum of oil paintings, etc. The place formerly belonged to the English. It was here the Maid of Orleans was burned, A. D. 1431.



PORTAL OF ST. OUEN ABBEY, ROUEN.

Dry Rot.

Having of late years had experience with the destructive and seemingly increasing, though not yet satisfactorily explained, fungi class known in the building trade as dry rot, I think that a few words anent the subject will not be amiss.

My first practical acquaintance with dry rot and its deteriorating work was at a village church of moderate antiquity. It had a few years previously been thoroughly restored, and there were a few small air ventilating grates round the building just above the ground. The part that engaged my special attention was curtained off for the use of the choir, as a vestry, close by the organ, and I was told that the floor which was laid at the restoration had been completely taken up twelve months previous to my visit, entirely rotted by the perniciousness and insatiableness of dry rot, and was relaid with pitch pine, those in power seeming to think that pitch pine was a universal panacea against dry or any other rot. As I saw it (after taking up the linoleum with which the floor was covered), the fungus had eaten through 1¼ in. pitch pine boards in twelve months, and still appeared flourishing in all its luxuriance. The worst places were cut out and replaced with new boards, the linoleum replaced as before, and the reckoning day staved off for a time. Circumstances took me away from the place, and I have not had the opportunity of inquiring after the progress of events since. This I may say, that the church is situated on a high hill, and its surroundings are such one would think unfavorable to dry rot.

My next acquaintance with dry rot was in a building the very reverse of the above—a flour mill in a large town in a valley, with the canal on one side of the building, and a goit or sluice passing under the mill to turn the water wheel. The floor of the basement was, and is, of wood, and below the level of the canal, so that dampness pervades the atmosphere, and ventilation is difficult and expensive—in fact, there was no ventilation to the basement floor, the infected part.

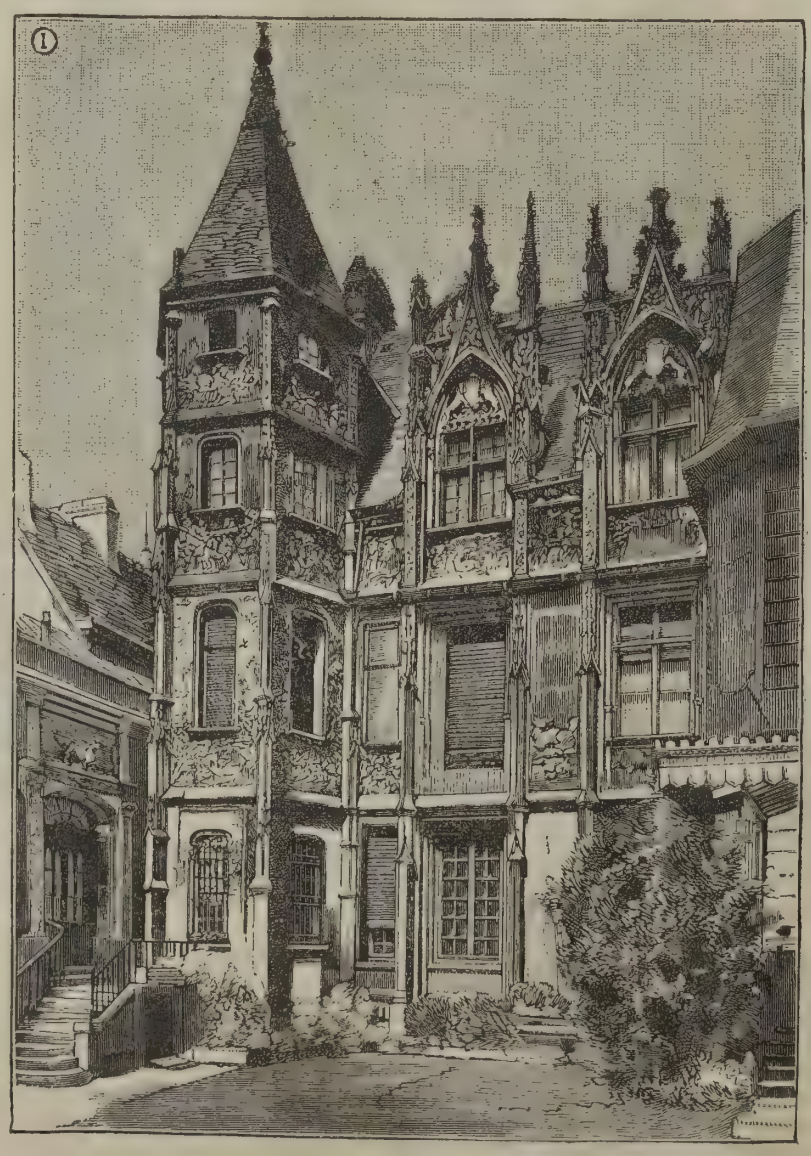
Probably the mistake is in having a wood floor at all, and the most effective remedy, I think, would be to take the whole basement floor up and relay with concrete. As it is, the floor has to have periodical attacks made upon it by the joiner, first in one place and then another. I had the privilege or misfortune to make one of these attacks, taking up a considerable portion and relaying with new timber, having the joists and the under side of the floor boards coated with a good coat of tar. Two years afterward I took up the adjoining part, and so had the opportunity of examining the tarred part, and with satisfaction noted that the dry rot did not seem as yet to have touched it. My next experience was at the post office, built twelve or fourteen years ago. The building itself was designed and built under an architect of professional status and good practice. Here again it was the basement floor. The building itself has a well drained, flagged area all round, the flagged bottom being below the basement floor, and the upper part covered with cast iron grates flush with causeway. Iron ventilating grates led from this area to underneath the floor, the floor being carried on joists on sleeper walls. Here I found dry rot flourishing, and, after taking part of the floor up, found water to the depth of 3 in. or 4 in. Upon tracing this, I found it was fed by a small cistern fixed to supply the kitchen range boiler, the cistern being fed by a ball tap which was out of gear, and had probably been so since the completion of the building. The leakage was of course stopped, the water pumped out, some of the soil taken out to give greater air space underneath the joists, and the worst parts of the floor taken up (which, by the bye, was just where the water had stood; the ground rose slightly from here, and where there was no water the wood did not seem infected) and replaced by new wood, the wood, sleeper walls, and soil being well soaked and washed with copperas or blue vitriol (cupric sulphate) dissolved in boiling water. This was little more than twelve months ago, so I have not yet had the opportunity of taking notes. The next sphere of action was on the opposite side of the road to the post office, in a large warehouse. Here, again, the evil was in the basement floor, which was below the road proper; but a small back yard sloped from the road to the level of the floor, for the convenience of wagons. This inclined yard butted against the warehouse wall with no area, dry drain, or air space intervening. The worst part of the floor was the part adjoining this yard. Indeed, the opposite side of the floor, which adjoined other rooms, was quite sound, the rot seeming to have commenced at the joist ends which butted against the wall bounded by the yard, and to have traveled along them and the under side of the floor boards six or seven feet. The room had a wood dado fixed round it, the part fixed to the wall in question being completely infected and eaten through in several parts; in fact, the space between the dado and the wall was quite choked up with the fungus, it having apparently traveled up the dado and from there to the window bottoms, linings, and even into the window sill, and from thence into the soil of the yard, exhibiting white, minute roots between the joints of the yard sets. One of the windows had a round, white, bulbous protuberance growing outside, something like a mushroom.

This floor had no ventilation, and after taking out all imperfect parts, some of the soil, and the sleeper walls, the ground, walls, etc., were well washed with a solution of blue vitriol, with which also the new wood was impregnated, the joists being carried on brick piers without wall plates, instead of the old sleeper walls with wall plates. An air drain was made between the yard and the wall, covered with iron grates, grated openings being made from this to underneath the floor.

My attention was next directed to the basement floor of another room in the same building. This had an open area adjoining the external walls, but no ventilation of any kind to the floor. The proceedings in this were somewhat similar to the last.

The next attacking point upon this thriving fungus was in the boxing pit of the gymnasium of an athletic club. The attack was not made with the gloves, but by pulling the whole floor up, which was several feet below the road, and had no ventilation. The proceedings here were somewhat similar to the last, except, there being a fireplace, an air draught was led from underneath the floor to feed the fire and to create a draught.

My next acquaintance with the enemy was in a small dwelling house which has only been built two or three years. The house stands by itself on the side of a hill facing a wood, the hill being partially excavated for the building. The kitchen is at the back, and has a cellar underneath. At the front is a small parlor, but no cellarage, the floor of this room resting on sleeper walls, with a moderate depth of space between the floor and the soil, and with a small air grate leading to the front. The sides are parpoint walls (and will be the party walls should houses be erected adjoining), having the soil of the hill butting against them; but on one side there is an open passage leading from front to back, between the hill and the house proper; but the other side had nothing (excepting a fireplace) but the parpoint wall between the soil and the floor, and it was here the mischief commenced—between the fireplace and the kitchen wall. The rot had first attacked the wall plate in this corner, which crumbled away between the finger and thumb; from thence it had traveled to the joists, floor boards, and up the back of the plinth, infecting the whole of the woodwork between the fireplace and the kitchen wall, and from the side wall to about a yard into the room. The other or front side of the fireplace was not touched at all, and here I may



HOTEL BOURGTHEROULDE, ROUEN.

say that the ground outside sloped to below the joists. The fungus in the infected corner appeared to flourish on the soil under the floor; but it had not traveled beyond the area of the infected part of the floor. The soil was full of small, minute white roots wherever the fungus grew. The infected part was taken out, the ground, walls, and timber carefully washed and soaked with a strong solution of blue vitriol, and an air drain constructed outside.

In conclusion, I may say my observations are these: That the material first infected seems to be Baltic deals, either red or white; that after the *fungus germs* have got established, they do not appear particular what sort or class of timber they attack; that they appear very partial to basement floors and damp, ill-ventilated places; that soil which is of an argillaceous character seems to encourage their growth, and a radius of one mile will include all the above cases.—*J. S. G., in Building News.*

Algerian Marbles.

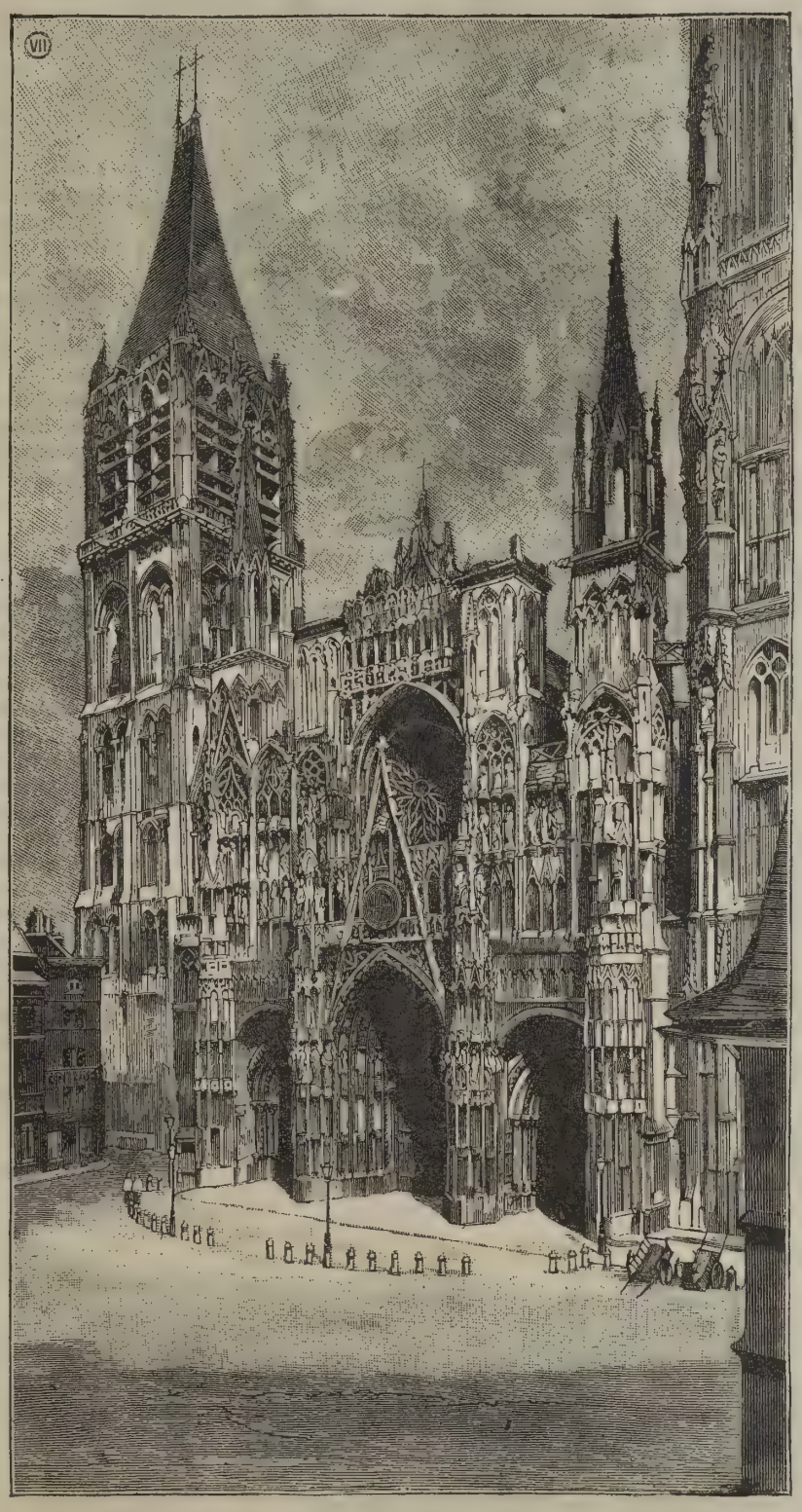
BY ARTHUR LEE.

Very valuable quarries of marble have been found in the French colonies of Algiers and Tunis. It was from these that the Romans procured their so-called Numidian marbles. Numidia proper is outside of the district in which the greater part of the marbles are found; but it gave its name apparently to all of them. Pliny says that Numidia produced nothing remarkable except marble and wild beasts, and that Numidian marble was first brought to Rome under the consulate of M. Lepidus (B. C. 77), who used it in his own house. These marbles were greatly prized by the Romans, who imported great quantities of them; but after the fall of the empire they were altogether lost sight of, and have only lately been rediscovered and worked. The most beautiful varieties are found in a district about 20 miles northeast of Oran, in the western part of Algeria. Near the little village of Kleber rises an imposing mountain called by the colonists "Montagne Grise," from its arid, gray appearance. This mountain is one of a chain which extends in a northeasterly direction from Cape Aiguille on the west to Cape Carbou on the east, and is about the center of the range. On its summit there is a level plateau with a superficies of some 1,500 to 2,000 acres, and running east and west. It is here that the marble is found. At the extreme east a creamy-white marble is produced called "Marmor bianco;" next comes marble of a beautiful flesh colored tint—"Rosa carnagione;" then a fine variety of "Cippolino;" and some yellow marbles of various tints—"Giallo avorio," "Giallo canarino," "Giallo paonazzo," and "Giallo antico." At the extreme west there are a number of breccias—"Breccia sanguina," "Breccia coronata," "Breccia dorata," "Breccia grande"—a deep red marble, somewhat brecciated, and greatly resembling, if not identical with, the famous "Rosso antico"—and a fine black and white marble, "Bianco e nero antico." There are numerous depressions to be seen in the "Montagne Grise," each evidently marking the site of a Roman quarry. Some blocks of stone have been found actually extracted, and some with grooves and wedge holes ready to be raised; but what is somewhat strange, there is no indication of any great monoliths having been prepared, and there is none of the usual debris of a quarry. Colonel Playfair is of opinion that the emperors carefully guarded the secret of these quarries, and that only comparatively small pieces of the precious stone were taken away just as they were separated from the mountain, without even any preliminary hammer dressing. They were probably worked up into mosaics, or used for other finer decorative purposes. Seneca mentions their employment in conjunction with those of Alexandria.

The rediscovery of these beautiful marbles came about by the finding of some very fine mosaics in some excavations made at St. Leu, in the vicinity of Arzen, the ancient Portus Magnus. These were recognized as being very like some of the long lost antique marbles found in Rome, and led to a careful examination of the surrounding country, and the discovery of the treasures on the "Montagne Grise." Some of the first geologists in the country had carefully examined the mountain on account of the iron ore which it contains; they decided that it was not in sufficient quantities to make the working of it profitable; but they had failed to appreciate that it had already performed its task by communicating an almost endless variety of tints to the marble rock.

The beautiful Algerian onyx marble is found at Ain Tekbaleli, near Tlemcen. It is translucent, faintly white and iridescent, and of stalagmite formation, bearing a resemblance to onyx—whence it derives its name. Bands of crystalline white alternate with others of a yellowish brown, dark brown, or umber color. In ancient times, these quarries supplied the inhabitants of Rome and Carthage with the marble which was much used for monuments and for the internal decoration of houses. It was often cut into small vases for holding precious ointments, and was one of the stones known as Oriental alabaster. It was not an alabaster as we now understand the word; it is a true marble or carbonate of lime. It was very largely used in the beautiful Moorish architecture of Tlemcen, where Numidian marble is never found. Evidently, with quarries of onyx at their doors, neither the Romans of Pomaria, nor their successors, the Moors of Tlemcen, were tempted to transport any other variety for the decoration of that important city, so many, many miles from the sea. Great quantities of Algerian onyx have of late found their way to Paris, where it has extensive employment. With white or any of the red or pink marbles, it forms a beautiful combination.

The marbles of Tunis consist of three distinct varieties—a yellow marble, the true "Giallo antico;" a fine rose colored marble, and a small brown breccia. The quarries are now being extensively worked by a Belgian company whose headquarters are at Liege. They are situated near Chemtou, on the line of railway between Algeria and Tunis, in the valley of the Medjerda. This locality is not far from the eastern boundary of Numidia. A road was constructed by Hadrian, on his first visit to Africa in 128–129, between it and Tabarca for the purpose of transporting the marble to the sea coast, and thence to Rome.—*Building News.*



CATHEDRAL OF NOTRE DAME ROUEN.

Ancient Relics at Sidon.

Additional dispatches received at the State department from Consul Bissinger at Beirut, Syria, respecting the remarkable archæological discoveries at Sidon, state that the number of sarcophagi excavated is seventeen, found in seven distinct chambers. Beshara Effendi, civil engineer, is having a tunnel excavated for their removal to the seashore, whence they will be shipped to Constantinople. A shaft thirty-five feet square, discovered in the western chamber, led to a sarcophagus twenty-five feet below the surface, with seven large rooms cut out of the solid rock. In a room adjoining the western chamber four sarcophagi were found. One of these, of pure white marble, highly polished and exquisitely sculptured, is ten feet six inches long, six feet nine inches wide, and five feet high, with a cover three feet higher. The roof is composed of tiles resembling leaves, and also shows rampant figures, crouching lions, human heads with double faces, and stags' heads with curved horns. Three of the sides of this sarcophagus are devoted to battle scenes and emblems of war—arrows, spears, bows, and lions, with dead, dying, and wounded soldiers.

The fourth side represents a hunting scene. There are also panels with richly ornamented geometric figures. In one of the battle scenes there are prominent two nude figures of a man and woman. The color is still fresh, as if put on recently. There are scarlet cloaks, blue tunics, and blood oozing from the wounded warriors. In the north room seven Egyptian sarcophagi were found richly carved. In the eastern chamber there were three sarcophagi, one plain and one lavish with exquisitely carved sculpture. This is the famous so-called Greek sarcophagus. It is surrounded by a porch of eighteen fluted Ionic columns and four Doric columns at the corners. Between each of the columns stands a beautiful girl representing "Grief," all cut without a spot or blemish. Two sarcophagi were found in the south room, one of black marble, the other of white. Inside one of these was found a gold ring, a gold chain, and an alabaster vase. The others had been rifled of their contents without suffering any special injury. The local Turkish authorities are jealously guarding these valuable relics.

A Windmill Clock.

A new pattern of a fog bell is to be anchored off Nix's Mate, Boston Harbor. The machinery is constructed on the principle of clockwork. The power for winding it up is furnished by a windmill arrangement 12 feet square, consisting of a number of sails so placed that they revolve at every breeze. A rod is attached to the middle wheel, driven by the pendulum, so that it falls seven times a minute upon a gong, the sound of which can be heard from five to seven miles. The machinery when wound up will run ninety hours without any other winding. The new fog bell is said to possess advantages over all other inventions of the kind in its perfect regularity and in requiring no care.

THE dome of the great telescope of the Lick Observatory, upon Mount Hamilton, is now in position. The framework is covered with a sheathing of copper and nickel. The dome is a hemisphere about seventy feet in diameter. The hope now is that by the middle of September the largest telescope in the world will be ready for use.

NEW HARDY PASSION FLOWER.

(PASSIFLORA CÆRULEA CONSTANCE ELLIOTT.)

An addition to the list of climbing plants suitable for open air culture in this country is such an uncommon occurrence, says the *Garden*, that peculiar interest attaches to the appearance of a new white-flowered variety of such a popular old favorite as the hardy blue passion flower, which, in favorable localities for its growth, is one of the most beautiful wall climbers in cultivation. When this white-flowered variety, Constance Elliott, was first announced, many were induced to think that an albino of Passiflora cærulea belonged to that large family of mythical plants that exist only in the imagination of nurserymen, and certainly the first flowers that were seen of it did not go far to refute the idea, as they were decidedly too green to be termed white. Since, however, the plant has become widely distributed and grown under various conditions, it has quite answered to the description given of it at the outset.

Its flowers, we may here remark, are not snow white, but ivory white, both in the sepals and the fringe, which in the original blue passion flower is of a bluish shade. The Constance Elliott variety, moreover, is a vigorous grower and exceptionally florifercus, much more so, in fact, than its parent, but why such is the case is unexplainable. In every place where the common passion flower succeeds, this new white variety will no doubt supplant it, on account of its being more attractive in flower; and a more delightful garniture for a veranda, alcove, pergola, or wall could not be chosen from the long list of open air climbers. I have seen the Constance Elliott passion flower several times growing and flowering in the greatest luxuriance, but I have never been more struck with its elegance and beauty than when I saw it festooning a veranda, last September, in M. Herbst's garden, at Richmond. It was getting dusk at the time, and the flowers seem to stand out in bold relief from deep green foliage in a charming way, and I at once saw what a valuable open air climber it was.

The variety, I believe, originated in a Devonshire garden, and was distributed by Messrs. Lucombe & Pince, of the Exeter nurseries, and few among the many beautiful plants sent out by that firm surpass this one in value. It has now become tolerably common, for as soon as it was known to be "a good thing" no further recommendation was needed.

The original Passiflora cærulea, represented in the annexed woodcut, is one of our oldest garden plants, having been in cultivation since 1699. It is a native of Brazil and Peru, in the mountainous districts where the climate is mild, about the same climate, in fact, as the southern part of these islands, where the plant is thoroughly at home, and not only flowers profusely, but ripens its fruits. There are few prettier sights in autumn than a wall clad with passion flowers, and hung in profusion with their great egg shaped fruits of orange yellow amid the luxuriant green foliage. Like all climbers of a similar degree of hardiness, the blue passion flower thrives best against a warm, southerly exposed wall, though on other aspects it flowers well, and may even be grown on open bushes in some favored parts, but under such conditions it rarely fruits well. In very severe winters, such as that we experienced in 1879–80, the passion flower is killed, unless protected; but the plant is so rapid in growth that if a large plant is killed it may be replaced in a season or two if the young plant is treated liberally. There is nothing to say with respect to its culture, as it grows well in any good garden soil, the better if light and rich.

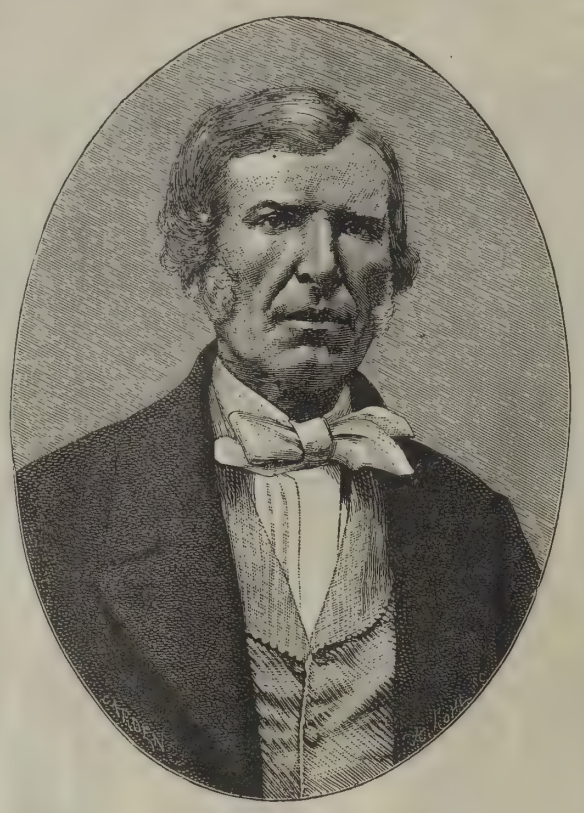
There is no other passion flower that can be grown successfully in the open air in this country, the majority of the species being natives of tropical and sub-tropical regions. W. G.

Effects of Change of Temperature on Girders.

Some experiments made by Mr. Fairbairn and Mr. Braidwood show that iron loses a considerable proportion of its strength when heated to a temperature of more than 220° Fahrenheit, and that it becomes uncertain below 32°. Mr. Clarke described the effect of the sun coming out and shining on the Conway tubular bridge for half an hour to have been to raise the tube vertically one inch; and he mentions that at night, from the low temperature, the deflection was always greater than in the day time. Mr. Fox instances the effect of frequent and great changes of temperature on some short girders, six feet long, which support the hoods of the forges in his workshops. In the day time they are so warm that the hand can only just bear the heat. At night they become cold. The effect is to make the girders swag, and the swagging appears to be continually increasing. Some have attained as much as three inches deflection in the center, but their strength does not seem to be impaired.

HENRI JACOTOT, RAISER OF GLOIRE DE DIJON.

Until Henri Jacotot delighted the rose growing world with Gloire de Dijon, there was no hardy climbing rose of anything approaching yellow in color. That



HENRI JACOTOT.

a chance seedling should suddenly supply this want in every particular ought by itself to be sufficient inducement to all rose growers to sow the contents of every rose hep that they can lay hands on; for the fact unfortunately remains that the pedigree of Gloire de Dijon was not preserved, and its parentage consequently is not certainly known. The appearance of the plant, however, can hardly fail to give an impression of a strong Bourbon influence, and the late Mr. H. B. Ellwanger, of New York, expressed his opinion that the variety was raised from seed of a tea that had been fertilized by some Bourbon rose. From recent correspondence with Mons. F. Jamin, it appears probable that one of the parents of Gloire de Dijon was the Bourbon Madame Desprez, but no one seems to have any very definite idea as to what the tea-scented parent may have been.

Be its origin what it may, however, Gloire de Dijon remains the delight of rose growers in every part of the world where roses can be grown, and its raiser, the late H. Jacotot, whose portrait is engraved in this month's issue, will be thought of by all grateful rosarians as having been a benefactor of his race. An ingenious writer in a foreign contemporary has lately been endeavoring to show that no rose can be of real value, or a true credit to its raiser, unless both its parents are known; but as long as a variety has qualities that commend it to every lover of roses the raiser's name will be cherished, and certainly the name of Jacotot rosarians will not willingly let die. As for the qualities of Jacotot's great rose, it seems absurd to attempt to say anything fresh about a rose that is already classical, and it will be impossible to do better, in concluding this brief reference to the raiser of the most popular rose the world has ever known, than to quote the description of the greatest classic of rose literature, Canon Reynolds Hole, who says of Gloire de Dijon:

"Its flowers are the earliest and latest. It has symmetry, size, endurance, color (five tints are given to it in the rose catalogues—buff, yellow, orange, fawn, salmon, and it has them all), and perfume. It is what cricketers call an 'all-rounder,' good in every point for wall, arcade, pillar, standard, dwarf, *en masse*, or as a single tree. It is easy to cultivate out of doors and in. It forces admirably, and you may have it almost in its summer beauty when Christmas snows are on the ground. With half a dozen pots of it, carefully treated, and half a dozen trees in your garden, you may enjoy it all the year round; and if ever, for some heinous crime, I were miserably sentenced for the rest of my life to possess but a single rose tree, I should desire to be supplied, on leaving the dock, with a strong plant of Gloire de Dijon."

Admiring often the beauty of Gloire de Dijon, both in cottage and other gardens, we thought last year that it would be well to find out something of the raiser and give a portrait of him if possible. We found on inquiry that no portrait had been engraved. We succeeded in getting a photograph, through the kind aid in the first instance of M. F. Jamin, of Bourg-la-Reine, and afterward of Mr. Webber, of the botanic gardens at Dijon, who kindly communicated with the family of Henri Jacotot. We have the pleasure, therefore, of offering the first portrait engraved of a man who has added a great charm to our gardens. Jacotot lived and was a nurseryman in the town of Dijon, in Burgundy, and died there not many years ago.—Ed.—*The Garden.*

Gloire de Dijon.

Among roses which have stood the test of time, and which still not only maintain their position, but are ever increasing in popularity, few can equal Gloire de Dijon; for although Marechal Niel appeared a few years ago as if it would carry all before it, it must be acknowledged that as an outdoor rose it is as much inferior to Gloire de Dijon as it is superior to the latter under glass. I have grown Gloire de Dijon in all sorts of forms and positions out of doors, and it is always satisfactory; and as a wall climber I do not think that any rose excels it, either as regards beauty when in bloom or the length of time during which it continues to produce its lovely blossoms. It is one of the earliest and latest of roses.

Who has not seen glorious examples of this popular rose on the sunny sides of villa and suburban residences, with its strong shoots of the preceding year's growth, perfect wreaths of delicately colored flowers? We have a plant of it here covering a large space of southwest wall that is seldom seen without blooms or buds on it. Under a continuance of mild weather, this grand old rose well deserves the title of perpetual flowering, and it is no slight boon to have a variety on which one may depend to furnish even a few blooms to cheer the dark days of early winter without the aid of glass. Therefore, to any one about to plant wall climbers, whether on mansion, villa, or cottage, I would say, if you have only room for one, let it be that well tried rose, Gloire de Dijon.—*Hants.*

PASSIFLORA CÆRULEA.

Fire and Water Proof Paper.

The process of manufacture consists in mixing about 25 per cent of asbestos fiber with about from 25 to 35 per cent of powdered sulphate of alumina. This is then moistened with an aqueous solution of chloride of zinc. The mixture is next washed with water, and then treated with a solution composed of 1 part of resin soap and 8 or 10 parts of water mixed with an equal bulk of sulphate of alumina, which should be as pure as possible. The mixture thus obtained should have a slightly pulpy consistency. Finally, there is added to it 35 per cent of powdered asbestos and 5 to 8 per cent of white barytes. This pulp is treated with water in an ordinary paper machine and worked just like paper pulp. In order to manufacture from it a solid cardboard, proof against fire and water, and capable of serving as a roofing material for light structures, sheets of common cardboard, tarred or otherwise prepared, are covered with the pulp. The application is made in a paper machine, the pulp being allowed to flow over the cardboard.

THE HOWE BROILER FARM.

Although there are a dozen large broiler farms at Hammonton, N. J., we have selected the largest and most successful in order to describe it to our readers. The proprietor, Mr. E. C. Howe, is not an incubator manufacturer, nor has he anything to sell. His sole business is that of raising chicks and ducklings for market. He is probably the most successful person at such business in this country, and yet, strange as it may seem, he had never seen an incubator one year ago, and knew nothing at all about poultry. Being given two or three lessons, he ventured ahead, and his most sanguine expectations have been realized.

To describe Mr. Howe's place, it may be stated that the entire space devoted to broilers is 26×200 feet, or about one-eighth of an acre; but one mile from his residence he has 600 hens on a farm, in charge of an assistant, which have also been a success. His broiler farm is on a town lot, in the busy portion of Hammonton, and quite close to the railroad stations. The building (see Fig. 1) is a center house, 20×20 feet, used for incubators, with a slaughter house at the rear, in which the chicks are killed and dressed for market. To each end of the incubator house is attached a brooder house, 10×70 feet, making a total space of 10×140 feet for the two wings. Each brooder house has a passageway two and one half feet wide extending the length of the building and leading from the incubator house. The brooder houses are divided into partitions 5×7½ feet each (deducting for passageway), making 14 brooders in each wing, or 28 in all, each brooder accommodating 100 chicks, the total capacity being 2,800 chicks every 10 weeks.

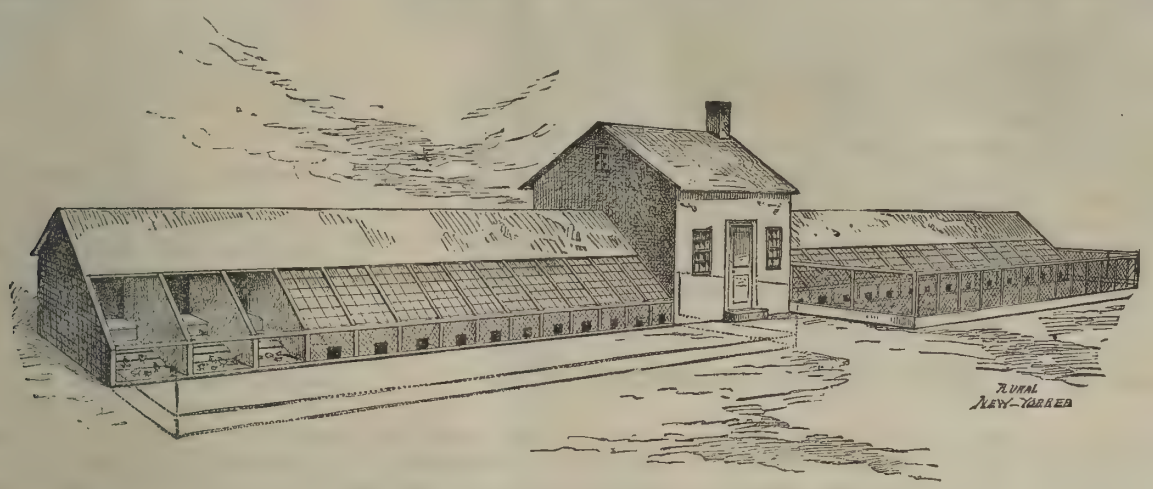


Fig. 1.—HOWE BROILER FARM.

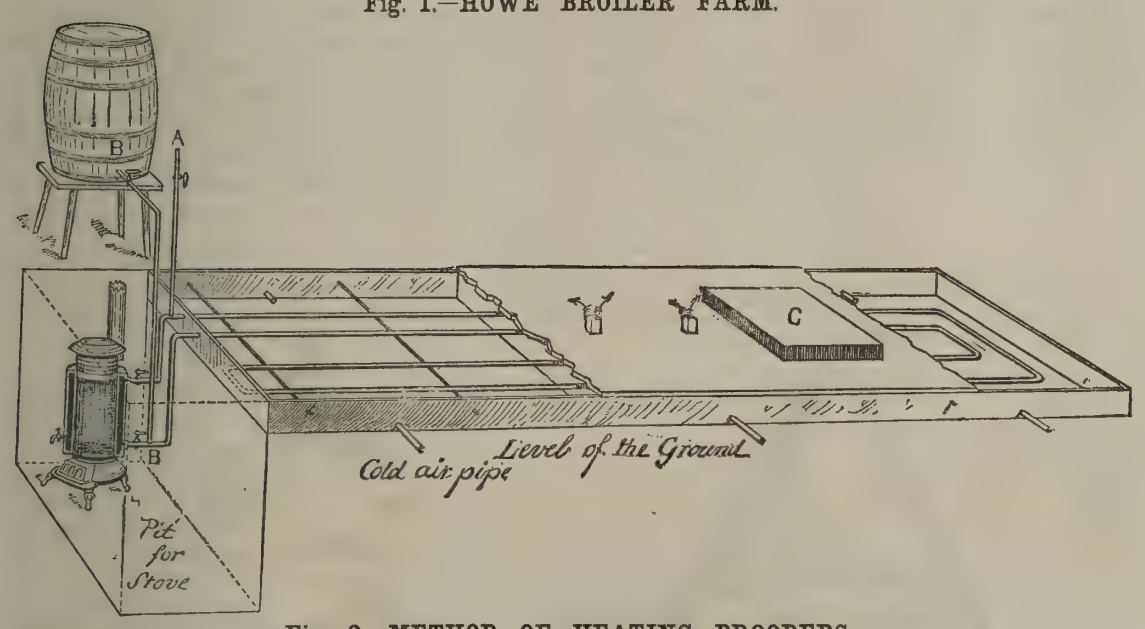


Fig. 2.—METHOD OF HEATING BROODERS.

Mr. Howe hatches and raises his chicks with hot water, and does not require lamps. With a single exception his incubators are home made, no lamps being used, the heat being maintained by drawing off a bucket or two of water from the incubators twice a day and adding boiling water. He has no regulators to them, and yet they require no watching, as he never looks into them during the day or night except to turn the eggs and add the hot water. Limited space will not permit of a full description of the incubator in this issue, but we will state that it is the ordinary hot water tank surrounded by sawdust.

The brooders are heated by hot water pipes (not steam) arranged as shown in Fig. 2. A stove with a circular water back (or boiler surrounding it) heats the water, which rises as it becomes heated, and flows into the pipes, returning to the boiler near the bottom of the stove. Observe the way the pipes are arranged, the first and last being together, thus evenly distributing the heat. A tube, half an inch in diameter (A), is intended to allow the escape of air in the pipes, and is also a safety valve. It is attached to the hottest or highest pipe. B is a keg or barrel filled with water, and connected with the lower pipe, to give pressure to the water The stove is in a pit, below the ground. The pipes are arranged side by side, in a box one yard wide, six inches deep, and 70 feet long, and are held level and in place by iron rods or supports of any kind. One or two tubes, one inch in diameter, extend from this box, or frame, to the outside—an arrangement which allows pure air to come in and circulate around the pipes; but these cold air pipes must be below the iron pipes, or the cool air will come out of the tubes under the brooders. As the air becomes heated it rises through the brooder tubes, which are fastened in the floor. These tubes are one inch in diameter and 2½ inches high. Over them are "mothers" or brooders, which are 28 inches square and three inches high (for very young chicks), but the legs are adjustable, and the mothers can be raised as the chicks grow. The floor must not be very warm, or leg weakness will result. The heat comes through the tubes and diffuses itself above the chicks. The temperature under the mothers should be 90 degrees.

The chicks are sold when from eight to ten weeks old, and at weights ranging from one to two pounds, according to the market (New York and Philadelphia), and they often sell as high as 60 cents per pound, April being the best month. The loss does not exceed eight per cent after they are hatched, the only difficulty being to procure fertile eggs in winter. When hatched they go directly to the brooders, and are fed nothing for 24 hours. The first 10 days they are fed every two hours (early and late) on bread cooked and crumbled for them, composed as follows: Ground meat, one part; corn meal, two parts; middlings, one part; ground oats, one part; also a small proportion of bread soda and salt. Sometimes this is varied by a mixture of corn, oats, and wheat, ground together, and one-fourth ground meat added. Mashed potatoes, chopped cabbage, ground bone, and fresh meat, occasionally, are always in order. After the tenth day the food is simply scalded instead of being made into bread. Raw grain is seldom fed, though cracked corn and wheat are allowed as soon as the chicks will eat them.

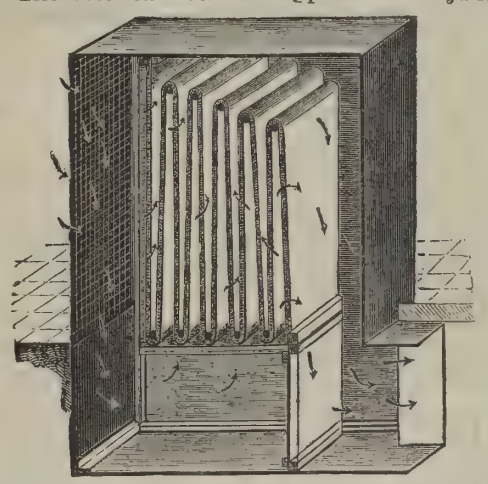
Particular attention is given to keep everything clean, and the chicks must at no time become chilled. On cold or damp days they are kept inside, but given the privilege of the yard on clear days. When they become too large to get under the mother, they will have become sufficiently hardy to do without, as the houses are warm. As Mr. Howe's house holds 2,800 chicks every 10 weeks, his capacity is 14,000 per year, and these are raised on less than one-eighth of an acre of ground; but it is customary to take a vacation in summer. He has hatched about 4,000 chicks, some of them selling for a dollar each, and is now preparing to hatch 3,000 ducklings. The cost of feed to produce one pound of chick is five cents, but the first pound is costly, as the expense of eggs, time of incubation, labor, etc., are important items. Mr. Howe does nearly all the work himself; but is sometimes assisted when very busy killing and dressing the chicks for market. He uses two stoves, which not only heat his brooders, but warm the incubator house, and boil water for the incubators.

There are quite a number of persons in Hammonton who raise broilers, but keep no fowls, as adult birds cause vermin, and cannot be allowed near the brooders. Mr. Howe is now considered very expert in testing eggs, and also as an operator of incubators. His chicks have brought not only the highest prices in market, but he has received many complimentary letters from commission merchants. He keeps cross-bred birds, but will, in future, grade up his stock with pure bred Plymouth Rock males. He has hardly been at the business long enough to be perfect yet. Although expending over $3,000, Mr. Howe has already received back nearly all of his capital, and expects to make a profit also.

As we stated, Mr. Howe has nothing for sale, though he always welcomes visitors; but as many readers may desire further information, we will state that Hammonton has a poultry association of nearly 60 members, of which Major Charles M. Jordan (late postmaster at Summerville, Mass.) is secretary, and he will kindly answer all inquiries or show visitors the farms. In describing Mr. Howe's place, we at the same time describe many similar, though smaller, establishments, while limited space prevents giving other methods which are in use; but none equal, the hot water method. The total capacity of all the brooders in Hammonton is estimated at 50,000 chicks every 10 weeks, yet the prices are high, and the market far from being overstocked.—*Rural New-Yorker.*

AIR FILTER.

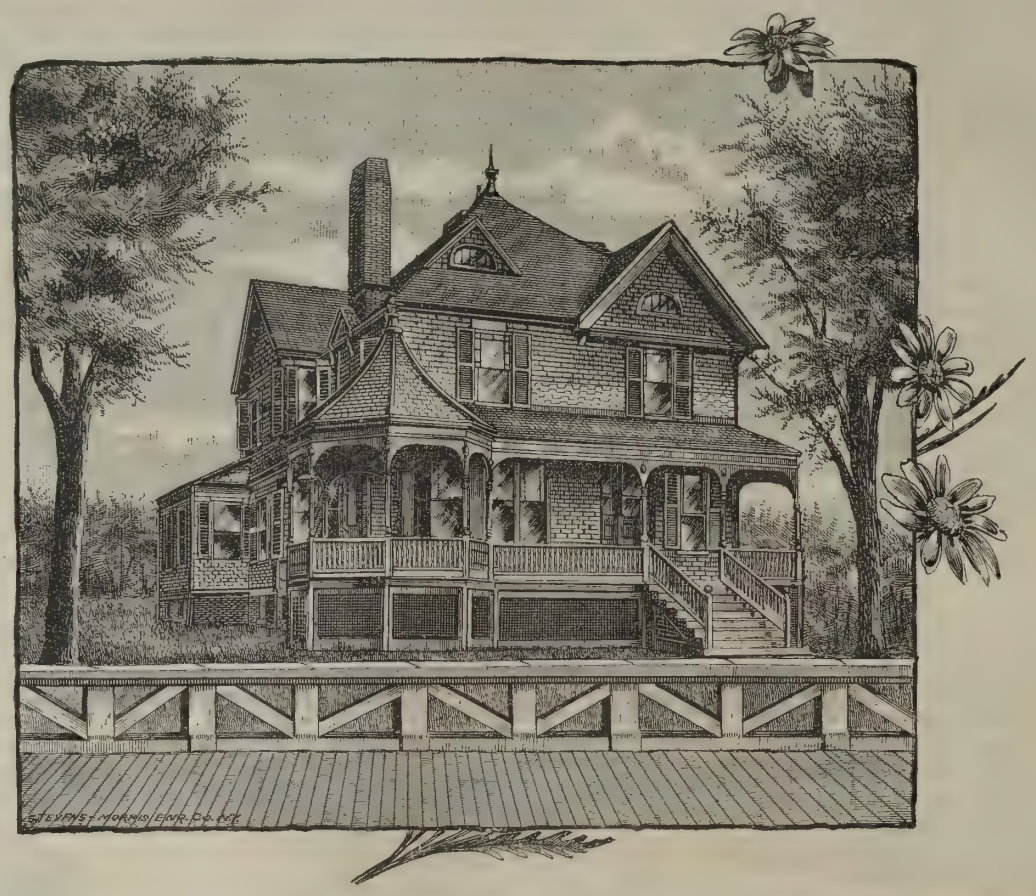
The object of this apparatus is to free the air which enters dwelling houses from dust and other impurities, more or less injurious to health and inimical to comfort. The filter can best be applied in conjunction with the hot air system for heating. In this case, it is placed across the main channel, and all the air which enters the rooms must first pass through it, as will be seen from the illustration we annex. The filtering medium consists of a thick and coarse cotton cloth, wound in zigzag fashion over ledges forming part of a frame in a cast iron box. The direction in which the air passes is indicated by arrows. The surface of cloth exposed to the air must be large enough not to offer any sensible resistance to the current of air, as otherwise a partial vacuum would be created, and air be drawn in from other sources. This, of course, is undesirable, and it becomes a matter of importance to be able, from time to time, to clean the filter cloth, which is done either by simply beating or by washing. To facilitate the renewal and cleaning of the cloth, the internal frame is so arranged as to be removable with very little trouble. The air passes only once through the cloth. The filter is usually put into the cellar of the house which is to be supplied with pure air, and where a hot air system is employed, it is best placed in the main air duct. The filter is now manufactured in various sizes, varying from 56 sq. ft. to 1,100 sq. ft. of filtering surface, arranged to pass from 16,000 cub. ft. to 330,000 cub ft. of air per minute, and costing from £4 15s. to £32 10s. The difference of pressure between the two sides of the filter is only 0·08 of an inch water gauge.—*Industries.*



DWELLINGS AT CAMBRIDGE, MASS.

We give herewith illustrations of several comfortable dwellings at Cambridge, one on North Avenue, erected at a cost of about $7,000. It is elegantly finished. Another engraving shows a pretty cottage on Brattle Street, cor. Mercer Circle. Cost between $5,000 and $6,000. All of these houses might be duplicated at a considerable reduction from the above costs by omission of expense in certain parts of the interior finish.

Another is a double house, pleasing in all respects. Cost about $7,000.



A DWELLING IN NORTH AVENUE, CAMBRIDGE, MASS.

About Plumbing.

The mistakes made by people in speaking of plumbing work are sometimes painfully amus ing to the plumber. Nine women out of ten, when they smell a disagreeable and unpleasant odor in the house, are positive that it is sewer gas, and must have the health inspector or the plumber at once to determine its source. Some time ago a lady called at a plumbing shop in a fashionable residence part of the north side. She wanted the plumber to send one of his men to the house at once and get her diamond earring, which had fallen into the wash bowl and had been carried into the waste pipe. The plumber asked her if there was a trap under the bowl, but seeing that she did not understand him, he asked her if there was a bend in the pipe below the bowl. She said there was, and "supposed that the plumber had too much pipe, and, not wanting to cut it, he bent it."

This will not compare with the sagacity of the lady who suddenly discovered the prevalence of sewer gas in the house. It may be just as well to remark right here that there is not a woman in Chicago who is not an expert on sewer gas. She can sniff it where it is not, where it has never been known, and probably where it never will be, but she is sure it is sewer gas. The lady mentioned above is the occupant of a second story apartment in a south side flat building. The plumbers were at work on the first floor. At noon one day the plumbers were eating their lunch, and one of them had some Limburger cheese, which he was holding on a stick over an open fireplace. Naturally, the odor was somewhat stronger and, perhaps, somewhat more penetrating than usual. It was wafted up the chimney through the cracks and fissures and into the apartments of the family on the second floor. Suddenly the lady came down and wanted the plumbers to come up and find where the "sewer gas was escaping." She said the whole house was permeated with it. The plumber was responsible for "sewer gas" in that house at least.—*Sanitary News.*

Antiquarian Discovery.

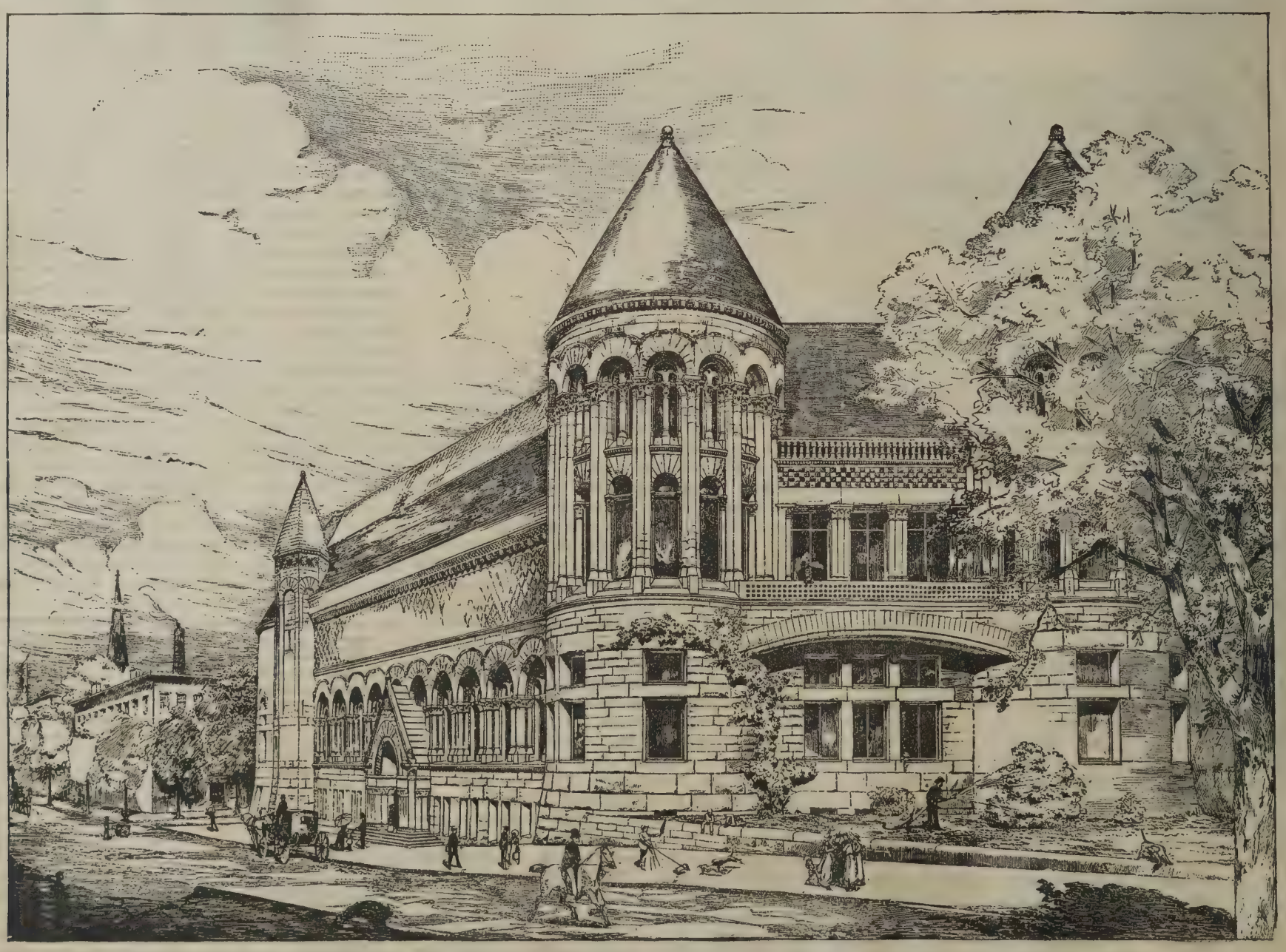
An interesting discovery was made recently at Winchester Cathedral during the construction of the monument to hold the skeleton of Bishop Courtenay. A workman, on making an opening in the choir wall, exposed De Blois' leaden coffer, in which that bishop had enshrined the bones of his uncle Richard, the second son of the Conqueror, who was killed by a stag in the New Forest. Richard's bones were thus preserved by King Stephen's brother, and the coffer, after some seven centuries, remains perfect. The inscription denotes that the coffer contains the bones of Richard, but the words "Beorn Dux" lead antiquaries to believe that the coffer also holds the bones of Earl Beorn, nephew of Canute.

YOUNG MEN'S ASSOCIATION BUILDING, BUFFALO, N. Y.

We find in a recent number of the London *Building News* a drawing of this structure, designed by H. H. Richardson. The engraving hardly does justice to the architectural excellence of the work; but we reproduce it as given, on a reduced scale.

Common Uses of Woods in England.

More conversant with the liv ing trees, their characters and habits, than with their uses. tree planters may perhaps have little interest in any detail of a subject somewhat outside their vocation; but apart from the picturesque or garden uses of trees, there is some importance to be attached to the uses to which trees can be applied after they have been cut down and manufactured for use. The oak is the grandest and most historical of all our forest trees. It has long been associated with our national defense as the chief element in shipbuilding, but harder and sterner iron has robbed the oak of this sentimental element, and the glory of our "wooden walls" of Old England has forever departed. Now the oak furnishes



DESIGN FOR YOUNG MEN'S ASSOCIATION BUILDING, BUFFALO, N. Y.—H. H. RICHARDSON, ARCHITECT.

the builder with the best material for door posts. Wheelwrights find in it the best wood for the bottoms of carts and wagons, and it makes the best of all wood fencing. Pollarded oak is a valuable element in the making of furniture, the knotted and intricately designed surface making the most elegant of veneering for what is known as oak suites.

To the elm is attached a melancholy and weird interest, inasmuch as it forms the small but solid inclosure in which dead humanity is placed. For commoner uses it is valuable for the making of wheel stocks, as it is not so liable to split, and enables the spokes to be fixed with any amount of force. It also enters into the construction of wide fellies, such as are employed in wheels for farm carts and heavy wagons. It forms a prominent element in the construction of that useful vehicle, the wheelbarrow, and the bodies of carts. It also enters into the construction of heavy bellows as boards, and in the form of seats to Windsor chairs it furnishes frequent means of rest to exhausted humanity.

Ash is a very valuable timber, and is fast getting scarce. It is not one of the favored ornamental timbers, and therefore is now much less planted than formerly. A dearth of ash timber would be productive of great inconvenience to many trades. Wheelwrights employ ash largely in the construction of carts and carriages. It forms the best material for shafts, and is widely employed in the making of all kinds of tool handles, especially those used in gardening, such as spades, forks, shovels, hoes, etc. In a less interesting way it is used for butcher's blocks, and many other common purposes.

The beech is a noble tree in life perhaps the most beautiful and decorative of all forest trees, but its uses in domestic life are not so varied as are those of some other woods. Beech is the chief constituent in the making of the elegant cane bottomed chairs found in the parlors of the poorer classes. It is useful for gun stocks, saddle trees in heavy harness, wheel fellies, and many of the lesser tool handles. Hornbeam is closely allied to the beech in life, but its uses are even less varied. Owing to its peculiar toughness it is often employed as cogs in mill gearing and in the construction of bearings, as its wear is regular and even. In another direction it administers to the employment of a section of the community—it makes the best of skittle pins.

The sycamore furnishes a peculiarly white, smooth wood, free from grain, and is used for the formation of curtain rings, butter churns and prints. For this latter purpose it is valuable, as it enables a finer design to be cut than does any other wood of home growth.

The lime in life is for a time the means of diffusing sweet odors and sweet sounds when the myriads of bees are seeking for its honey treasures. After death it enters into the production of other harmonies, as it is largely employed in pianofortes, where its value is seen in a comparative immunity from those fluctuations of contraction and expansion peculiar to most woods. Shoemakers find it also the most suitable material for their cutting boards, as it does not blunt the fine edges of their knives. The Spanish chestnut, also, is largely employed in the formation of sides for pianos, and at times is elevated as signboards. Formerly the chestnut was largely employed in the construction of principals and rafters for open roof churches, and is occasionally degraded to the common uses of posts and rails for fencing. The grand looking horse chestnut does not furnish a specially valuable timber, its wood being occasionally employed in the making of brushes. The birch, also, is employed in brush manufacture, and in the formation of hat blocks for hatters, also in the production of toys. In this way the tree becomes a source of pleasure to infantile life and a terror to breeched boyhood.

The fir tribes are productive of noble trees, but the timber is not of a specially useful kind. It is too soft, as indeed is the case with all wood that is the product of quick growth. Both the spruce and Scotch firs are of kindred quality, and are commonly employed in the construction of outhouses and sheds, or rafters to barns, and for temporary posts and rails, but, except where kept very dry, having only slight powers of endurance. If the pine tribes are to furnish the trees of the future, our posterity will find that in the matter of useful woods we have left them but an indifferent legacy. Larch is superior in enduring quality to the evergreen firs, and is therefore largely used as railway fencing and for ordinary estate and farm purposes. Yew wood is valuable when employed for veneering. It also makes most enduring gateposts. The maple is employed in the turning of bowls, and the bird's eye maple for the manufacture of furniture. Acacia is very hard and durable, and makes good ladder rounds and bottoms to carts. The poplars cut out good weather boarding, and are also employed in the formation of railway brakes, as the wood is woolly and tenacious. Walnut is valuable for the manufacture of furniture and gun stocks. Apple is used for wheel cogs, and the hard stems of the crab for beetle heads. Pear will dye black, and resemble ebony, and makes good walking sticks. The willow is famous for the production of cricket bats. The plum produces shuttles for weaving, and the cherry is used in the making of chairs. These are but a few of the many uses to which home raised woods are put, but for all our chief constructive purposes we give the preference to foreign timber.—*A. D., The Garden.*

A DWELLING ON BRATTLE STREET, CAMBRIDGE, MASS.

Sandstone as a Building Material.

Sandstones consist of small grains, chiefly silica, aggregated into a compact rock, the grains being cemented together by various substances. Sometimes it is carbonate of lime, sometimes silica or iron, and sometimes clay. The nature of the cementing mass has considerable influence upon the character of the rock. Iron is, however, the most usual, and the one which forms the most typical sandstone. There is a great variety of color, from white, through gray, yellow, red, and brown, to black.

Sandstones are of all geological ages, from the lowest sedimentary rocks to the most recent. The older rocks are usually the most compact, and in general contain some feldspar grains, and frequently a large quantity of clay, which gives them more or less of an argillaceous character. When sandstones are very hard, and their fracture harsh, and they contain small silicious pebbles, they are usually called grit. If the rock consist, not of grains of sand, but of numbers of pebbles cemented together, it is designated a conglomerate, which is further subdivided into pudding stones when e pebbles are rounded, and breccia when they are angular. And as these pebbles may consist of any kind of rock, there exists a considerable variety of these compound rocks, which are distinguished by the nature of the pebbles of which they consist. Sandstones are generally excellent materials for buildings; but, for this purpose, they should be firm and uniform in texture, and free from iron pyrites or iron sand, which would, by their rusting, not only spoil their appearance, but render them liable to peel off on exposure. Many sandstones, especially those from the thick beds of what is called the new red sandstone (or from the variety of colors from white to dark brown which it exhibits, the variegated sandstone), and which lies above the coal measures, are exceedingly soft when first quarried, but gradually become hard when exposed to the atmosphere. Others, again, especially those rich in clay, although compact and hard when freshly quarried, crumble away rapidly on exposure. The durability of this class of stone depends, however, very much upon the nature of the climate. Any sandstone which will bear exposure for some weeks, after being saturated with a solution of Glauber's salt, may be considered fit for use.

W. K. SULLIVAN.

Japanese Tea.

In the "Proceedings of the German Naturalists' Society for Eastern Asia," held at Yokohama, Messrs. Kellner, Makino, and Ogasawara give some interesting details of the mode of preparation and composition of Japanese tea. They state that the preparation differs from that of Chinese tea, chiefly in this: that the leaves are not intentionally allowed to ferment, but after moistening and cooling are at once placed in the oven; and also that the prepared tea is not flavored with fragrant flowers. The amount of theine is from 2 to 4 per cent; of tannin, 17 to 20 per cent. The aqueous decoction contains chiefly tannin, theine, and mineral substances.

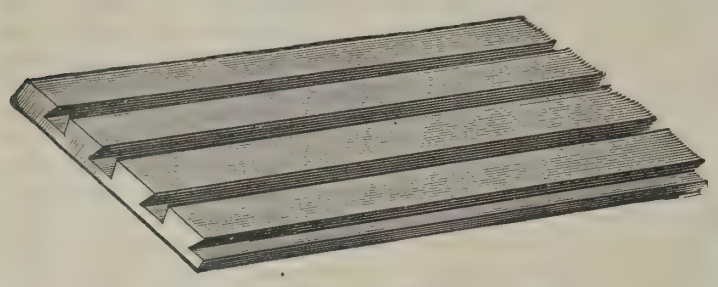
As is the case with all alimentary substances which are chiefly valued for their taste and fragrance, chemical analysis gives but little indication of the value of tea for commercial purposes. The evergreen organs of the tea plant exhibit phenomena during their first period of growth very similar to those which take place in the leaves of conifers; and, like them, they retain, even when old, a large quantity of proteinaceous substances and carbohydrates. It is true that, in consequence of the fresh formation of organic substance, the amount of nitrogenous constituents, including theine, diminishes slowly and regularly, as also the soluble non nitrogenous substances, while the fatty constituents accumulate rapidly, and to a remarkable extent, apparently in consequence of the formation of wax. The amount of woody fiber increases very rapidly during the first weeks, and after that remains nearly constant. The greatest changes are exhibited in the composition of the ash; the proportions of potash and phosphoric acid diminish very rapidly, while those of lime, magnesia and oxide of iron increase.

A DOUBLE HOUSE, CAMBRIDGE, MASS.

HALL'S PATENT SHEATHING LATH.

It has been said, and with a good deal of truth, that the public generally are slow in adopting new construction and new methods. Architects and owners are too apt to run in the same groove, and neglect to make themselves acquainted with the various new articles of manufacture placed from time to time upon the market. Of course, it cannot be expected that every trumpery and unimportant invention should receive investigation, but there are not a few improvements brought out in recent times of which the merits and advantages are so considerable that every architect and owner, in fact, every person building, would find it to their benefit to look well into.

Just such an article is Hall's combined lath and sheathing, which is designed to supersede ordinary lathing. It consists of pieces of lumber, of any length and width, having a series of dovetailed parallel grooves running lengthwise, as shown in the cut. This



HALL'S PATENT SHEATHING LATH.

sheathing is nailed on to the studs or furring, and is then ready to receive the plaster directly upon it.

The advantages of this new construction are several. First, it is cheaper, for it effects a saving of twenty-five per cent of the mortar and a good deal of labor in putting on. A mason can put on as much as fifty yards more of mortar a day than he can on ordinary lathing, so that, if for no other reason, the fact of its being cheaper gives it a decided advantage. But then it makes a much more solid and warmer wall, the dovetailed grooves give a better clinch to the mortar, and, above all, it will not crack.

The last advantage is one which, although it does not, perhaps, appear so obvious as some of the others, has, nevertheless, been proved to be a fact. No plaster job ever executed is entirely free from small cracks here and there, and with this sheathing, although some slight ones might appear, they would certainly be less in number than with ordinary lathing, and this has been shown to be the case in many instances where a job has been executed by the same mason and with the same mortar on the two different lathings.

But, beyond the very decided and important advantages already pointed out, there are others of not less moment. Of these, the foremost is the great aid the sheathing lends in increasing the strength of the structure. It is especially adapted for ceilings under floors, when strength and solidity are required, and for city ceilings and expensive buildings where cornice and center-pieces are put up. It ties the joists firmly together, prevents, to a great extent, all warping and twisting, and stiffens the floor and ceiling sufficiently to obviate the necessity of bridging.

Sheathing lath has evidently come to stay. Its use is every day increasing, and it will most probably, before long, be very generally employed. The manufacturer is I. G. Jenkins of Oswego, N. Y., who supplies not only the sheathing, but also the machines for making it.

All who are interested in fire-proof buildings and building materials should be familiar with the different kinds of hollow brick, porous terra cotta, flat arches, partitions, furring, etc., manufactured by Henry Maurer & Son. Their system of iron beam protection by means of hollow brick has been adopted in the new building of the Equitable Life Assurance Society, the Potter building, and other of the most important structures in the city. The office and depot of the company are at No. 420 East Twenty-third Street, this city.

Red Granite.

Near Assouan, Egypt, there are immense deposits of red granite, which furnished much of the material used by the ancient Egyptians in the making of obelisks and other monuments, which have since found resting places in various parts of the civilized world. The great obelisk of Luxor is now in the Place de la Concorde at Paris. Its height in the socket is rather more than 72 ft. Another of these monuments, known as Cleopatra's Needle, is a familiar object on the Thames Embankment in London. There are several in Rome, and one in New York (in the Central Park). The enormous size of some of these monuments, cut out of a single stone, has made them the wonder of all ages; more especially when the mechanical means at the disposal of the engineers of that era have been considered. An obelisk, still lying in an unfinished state in the quarry of Syene, shows us how these great monoliths were quarried. The obelisk was cut out in the solid rock, and polished on three sides before the fourth was disengaged; wooden wedges were then driven in the under side of the stone, and these were repeatedly moistened until they swelled sufficiently to effect separation from the bed below. From inscriptions and diagrams carved on some of the pedestals, we gather that the mode of transport to Lower Egypt was by the Nile, the stones being loaded on rafts. They were then dragged to the place where they were to be erected on a rude kind of carriage made of logs, which was set in motion by large trains of men and animals; they were finally lifted on the pedestals by means of an inclined plane. The lasting capabilities of Egyptian granite are proved by the sharpness of the sculpturing on the obelisks, which in some cases was cut as much as 3,000 years ago. It is, however, a curious fact that the same stones when set up in London and New York have shown signs of decay within a very few years of their erection.

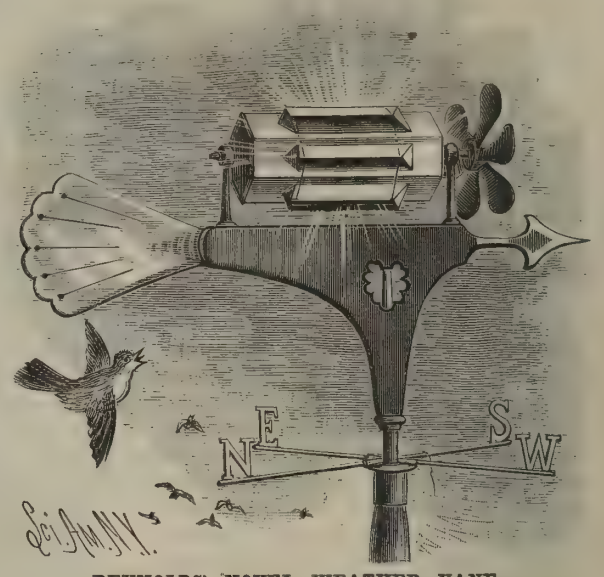
BE WISE IN YOUR SELECTION.

If it is known that a business man does not insure his property, his standing is impaired with those of whom he asks credit. It should be so; for no man should hazard property when by the payment of a small sum he can be secured against the ravages of fire or the damage by water. Successful business men regard life insurance as of vastly more importance than fire insurance. Property may never burn, but death is sure to occur.

It certainly pays to secure the best, when it can be obtained at the least expense. The Ætna Life Insurance Company, of Hartford, Conn., through its conservative management and successful business, is giving to its patrons, upon its admirable plans (two of which are copyrighted), the best results obtainable in the business. If you desire to know of the particulars of this company, and the peculiar advantages it offers, you will do well to address it at Hartford, Conn.

A NOVEL WEATHER VANE.

A decided departure from the ordinary type of weather vane may be secured very simply by following the construction shown in the accompanying engraving. A hexagonal barrel, with sides of mirrors, is mounted on its axis as shown, and a propeller or helix is connected with it at one end, whereby a rotary



REYNOLDS' NOVEL WEATHER VANE.

motion is imparted to the barrel by the action of the wind. Prisms are wired to the sides of the mirrors, which give to the rays a rainbow-like hue which is dazzling in the extreme. This contrivance has been devised by Mr. R. B. Reynolds, of Stockport, N. Y., and it possesses a novelty which will commend it to the attention of those seeking something quite unique in this line.

The Richmond Weather Strip.

The Richmond Weather Strip Company has just closed a contract with the Pennsylvania Railroad Company for the use of their improved car door weather strip on all passenger coaches on the main line and branches and all its leased roads.

As the Pennsylvania company is ranked as the highest authority in all matters of railway improvements, it is only reasonable to predict that this valuable improvement will go into general use on the passenger coaches of all the railways as an item of comfort and economy, which opens up a big future for the Richmond Weather Strip Company, and is a high compliment to the energy, skill, and business capacity of Mr. Frank Dennis, who has had the entire management and control of the business from its beginning.

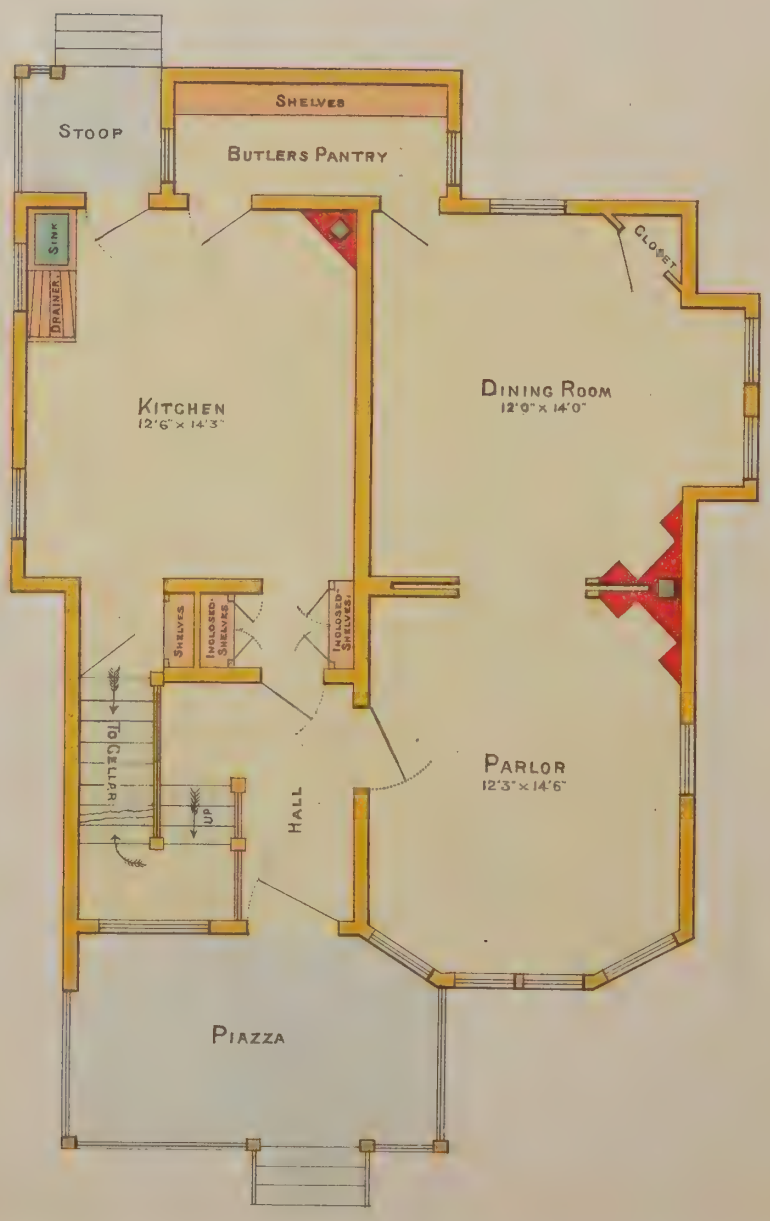
Vegetables in Japan.

The Japanese are almost vegetarians; not so much from choice, perhaps, as from necessity, though the eating of flesh is, in a great degree, forbidden to those who are religiously faithful. Fish is not among the prohibited articles of diet. Most of the flesh prepared for food is for the infidel. In 1880, in the whole of the empire, there were but 36,600 head of cattle slaughtered—the half of which was used by the foreigner. Nine-tenths of the food used consists of vegetables. Rice is the chief article—beans, peas, and sweet potatoes are largely consumed. A fourteen pound radish is very popular, and numerous sea weeds are used as food.—*Gardeners' Mon.*

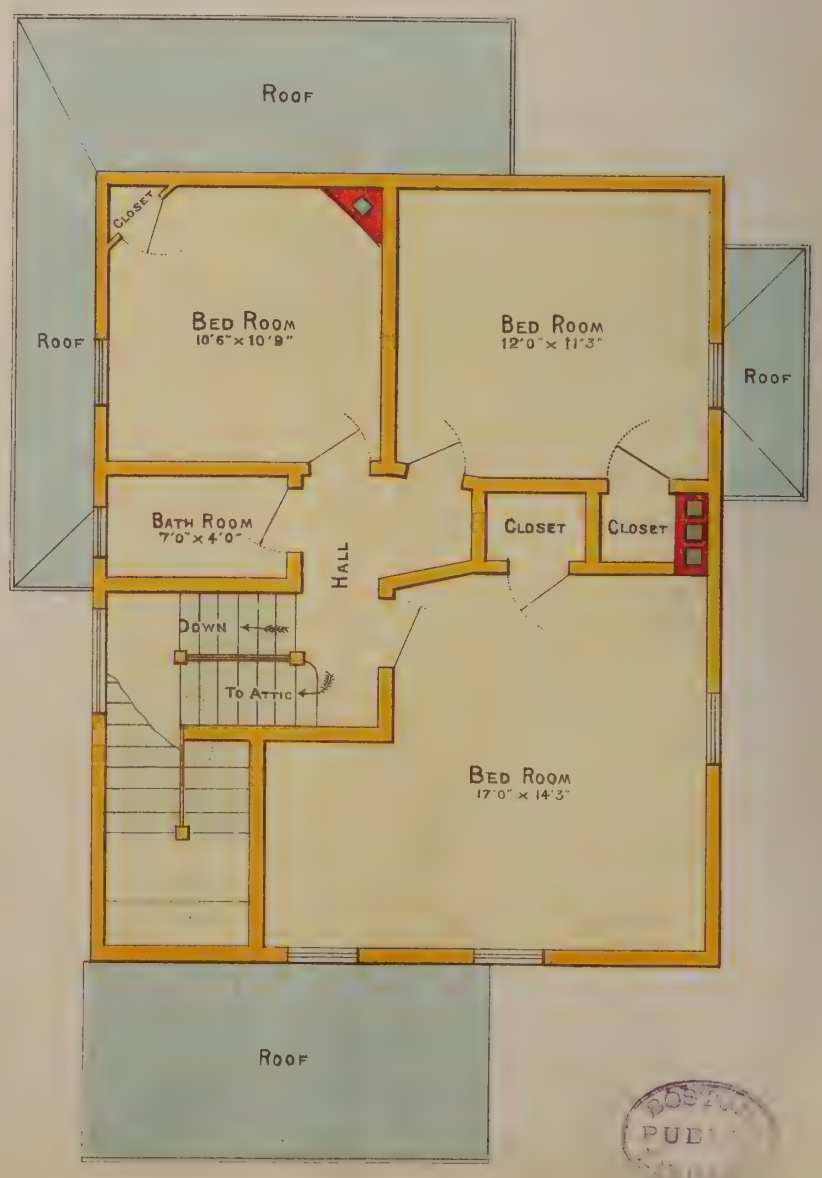
Full plans, specifications, and details, ready for the builder, of any of the houses illustrated in this publication, may be had on moderate terms at this office. Special plans and specifications for the erection of buildings of all grades are also supplied by us. Munn & Co., architects, 361 Broadway, New York.

Plans for the alteration and enlargement or improvement of buildings are also supplied.

A Cottage for Twenty Five Hundred Dollars.



Plan of First Floor.

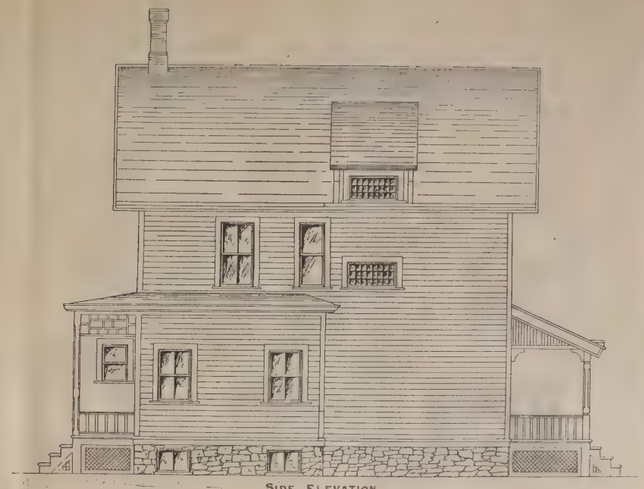


Plan of Second Floor.

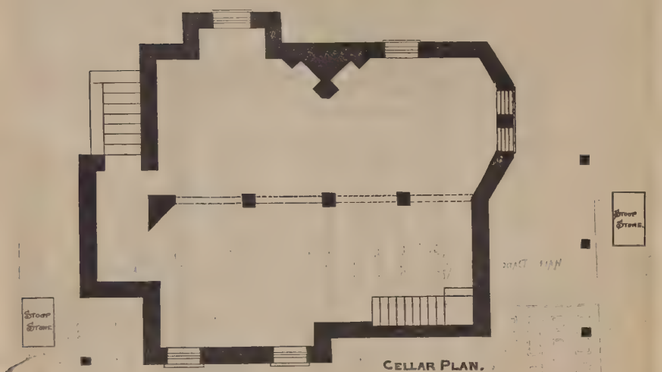
FRONT ELEVATION.

SIDE ELEVATION.

REAR ELEVATION.



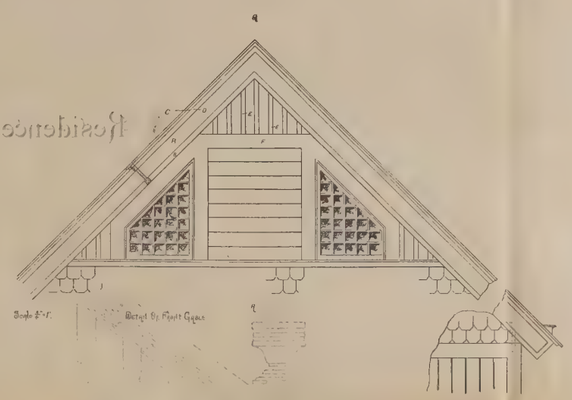
SIDE ELEVATION.



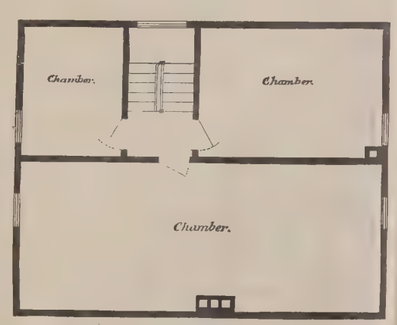
CELLAR PLAN.

A Twenty-five Hundred Dollar Cottage.

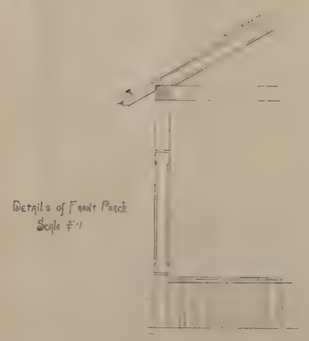
Section A-A



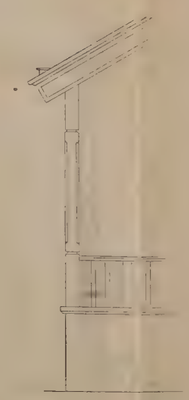
Scale ¾"=1' Detail of Front Gable



ATTIC PLAN.

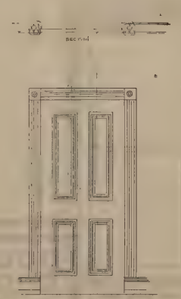


Details of Front Porch
Scale ¾"=1'



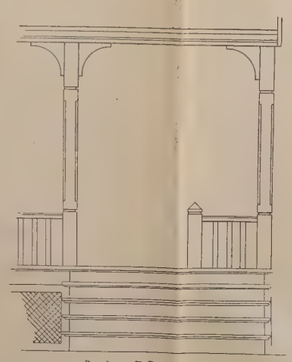
End View F Porch

Section of Front Porch

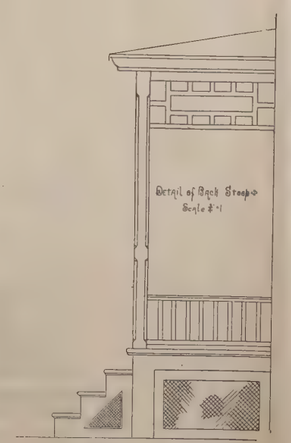


Details of Door Casing
Scale ¾"=1'

Detail of Side Dormer

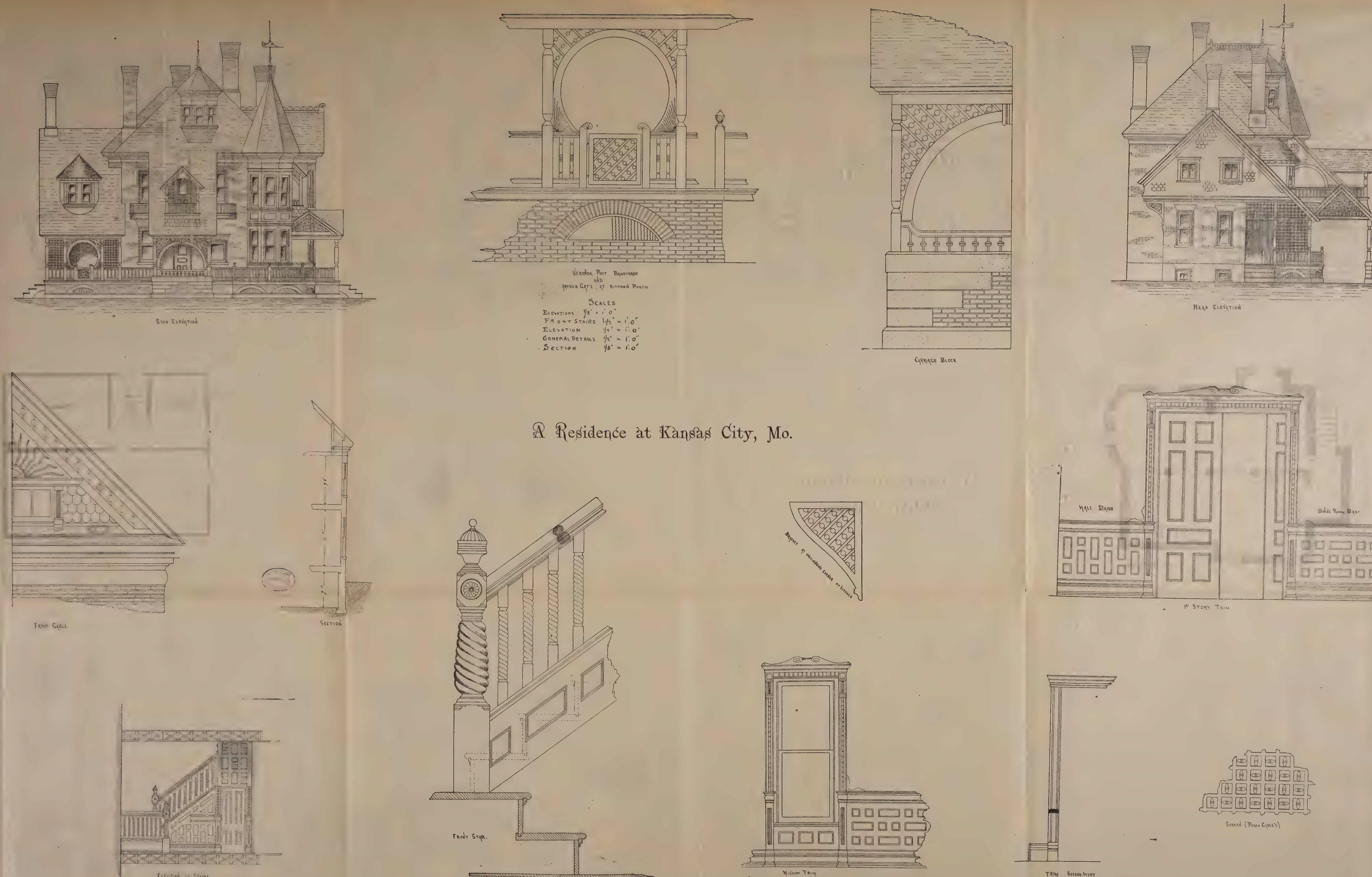


Details of F. Porch



Details to accompany Colored Plates. For description see Architects and Builders Edition of Scientific American for July, 1887

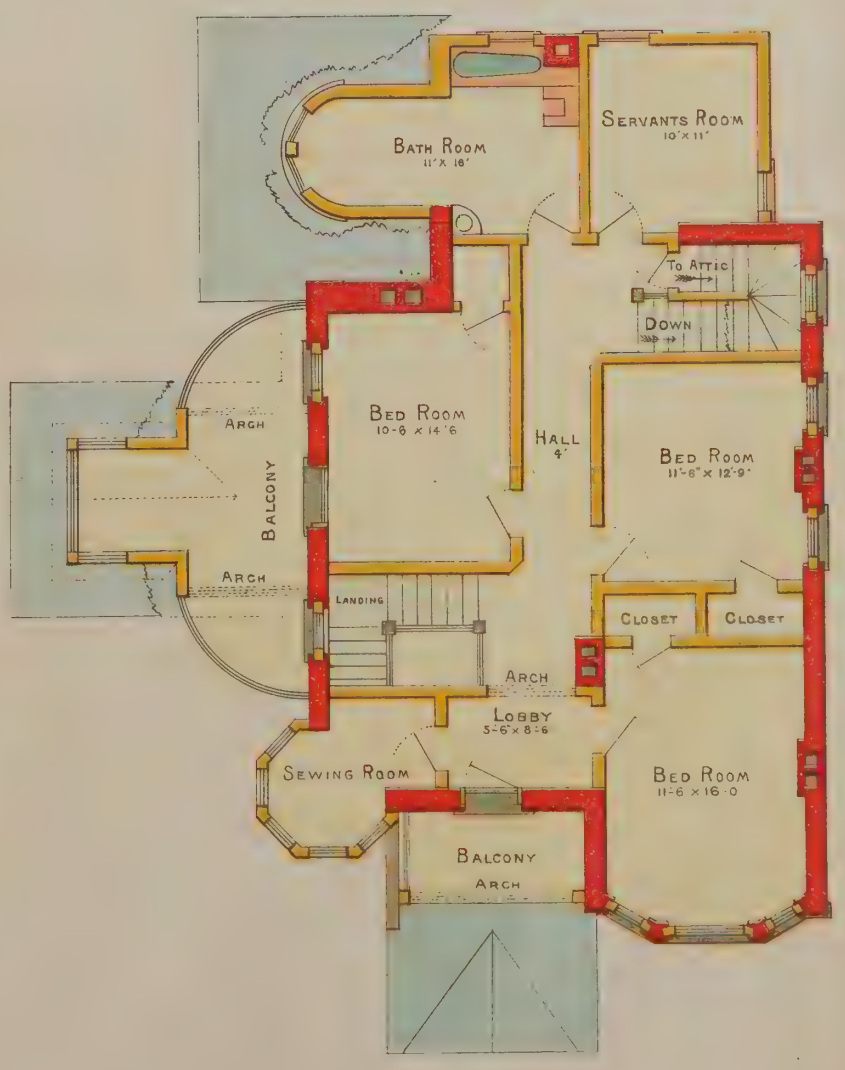
A Residence at Kansas City, Mo.



Details to accompany Colored Plates. For description see Architects and Builders Edition of Scientific American for July, 1887

A Residence in Kansas City, Mo.

Plan of First Floor.



Plan of Second Floor.

SCHUMACHER & ETTLINGER, NEW YORK.

SCIENTIFIC AMERICAN

Entered at the Post Office of New York as Second Class Matter.

ARCHITECTS AND BUILDERS EDITION.

Vol. IV. Subscription, $2.50 a Year. NEW YORK, AUGUST, 1887. Single Copies, 25 Cents. No. 2.

RESIDENCE, CORNER OF EIGHTH AVENUE AND BERKELEY STREET, BROOKLYN.

This house was designed for Mr. H E. Beguelin by F. Carles Merry, architect, of New York.

It is built mainly of brick with terra cotta trimmings, except the first story front on Eighth Ave., which is of Euclid stone.

RESIDENCE CORNER EIGHTH AVENUE AND BERKELEY STREET, BROOKLYN.

F. CARLES MERRY, ARCHITECT.

The entrance doorway has been treated in Romanesque.

The entrance hall and staircase are designed in a very original manner, in "Old Colonial," of cherry.

The parlor is finished in mahogany. The dining room is of oak, while the library walls and ceiling are entirely wainscoted in oak of very pleasing effect. The upper stories are finished in cherry and ash.

The building, which is elaborately decorated throughout, has a frontage of 40 ft. on Eighth Ave. and of 47 ft. 6 in. on Berkeley Place, and was erected at a total cost of $35,000.

Seven-foot-four Circulars.

It takes perfection to bar out improvement, and it is often taken for granted that an article of manufacture is perfect when it is not. The circular saw is a thing of slow growth. Various trade papers insist in keeping on deck an item to the effect that a man named Cummings, whose remains rest near Kalamazoo, Mich., was the inventor of the circular, notwithstanding it was invented before Cummings was born, and possibly before Cummings' father was born. It is within forty years, however, that the circular has become a success in the saw mill. Within that period circulars placed in Michigan mills were not satisfactory, and were made to give place to the straight saw. At first the thicker the saw, the better. It had never entered the mind of man that a thin saw would answer the requirements. Gradually saws of larger diameter and thinner gauge were made. It was discovered that speed gave backbone to a saw. The latest achievement in saw making is a circular eighty-eight inches in diameter—the largest ever made—and of eleven gauge. It was manufactured by E. C. Atkins & Co., Indianapolis, Ind., and is in use in the mill of Hurd & Co., at, or near, Xenia, Ind. One may properly ask, What next? Will the time come when circulars will be made so large that no double or three saw rigs will be necessary for converting the monstrous redwood logs into lumber?—*N. W. Lumberman.*

MARBLE may be stained or dyed of various colors by applying the solutions mentioned below to the stone, made sufficiently hot so that the liquid will just simmer on the surface. Blue, tincture of litmus; brown, tincture of logwood: crimson, a solution of alkanet root in oil of turpentine; green, tincture of sap green; red, tincture of dragon's blood or cochineal; yellow, tincture of gamboge or turmeric. Success in the application of the colors requires considerable experience.

Scientific American.

ESTABLISHED 1845.

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No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

NEW YORK, AUGUST, 1887.

THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

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This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid **Magazine of Architecture,** richly adorned with *elegant plates in colors* and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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All who contemplate building or improving homes, or erecting structures of any kind, have before them in this work an almost *endless series of the latest and best examples* from which to make selections, thus saving time and money.

Many other subjects, including Sewerage, Piping, Lighting, Warming, Ventilating, Decorating, Laying Out of Grounds, etc., are illustrated. An extensive Compendium of Manufacturers' Announcements is also given, in which the most reliable and approved Building Materials, Goods, Machines, Tools, and Appliances are described and illustrated, with addresses of the makers, etc.

The fullness, richness, cheapness, and convenience of this work have won for it the **Largest Circulation** of any Architectural publication in the world.

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CONTENTS

Of the August number of the ARCHITECTS AND BUILDERS EDITION of SCIENTIFIC AMERICAN.

(Illustrated articles are marked with an asterisk.)

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361 BROADWAY, NEW YORK.

A $4,000 RESIDENCE AT FLUSHING N. Y.

SPECIFICATIONS.

Quality.—All the material used to be of good quality, free from all defects impairing its strength or durability.

All timber, except where otherwise specified, to be of good, well seasoned spruce.

Sizes.—Girders to be 6″×10″, flush with top of beams. Sills to be 3″×8″. Plates and interties, 4″×4″. Posts to be 4″×6″. First and second floor beams, 2″×10″. Third tier, 2″×9″. All 16″ on centers. Rafters, 2″×6″; hip and valley rafters, 3″×8″; 24″ on centers; all studding, 2″×4″; 16″ on centers. Bearing strip, 1¼″×6″. Ridges, 2″×8″.

Framing.—All studding placed 16″ on centers. All door and window studs to be doubled, bridged once on each floor. Partition studs to rest on partitions below, where possible, and not on the floor beams. Spike a 2″×4″ beam to side of girder for floor beams to rest on, and spiked well thereto. All headers and trimmers to be doubled; all beams under partitions running parallel with same to be doubled; the entire frame to be mortised and tenoned and pinned together.

Sheathing.—The entire frame, from wall to plate, to be sheathed with 1″ matched hemlock boards, put on diagonally, and well nailed at every post and stud; this to be covered with No. 30 manila building paper, well lapped, and laid under door, window frames, and corner boards.

Flooring.—First and second story floors, except kitchen and bath room, to be laid with narrow pine flooring, well driven together and nailed to each and every beam. Attic to be pine, 9½″ wide, well driven together, and nailed to every beam. Kitchen and bath room to be laid with white maple, 2½″ face.

Siding.—Cover entire building, except where otherwise shown in drawings, with sound and clear No. 1 beveled clapboards, not less than 1″ lap, nailed every 16″, and set nails for putty. Do all necessary furring; set grounds for all doors. Shingle the vertical sides where shown with XXX 18″ pine shingles, laid not more than 5″ to the weather.

Roof.—The roof is to be sheathed with rough hemlock boards; valley and gutters to be lined with the best I. C. charcoal tin; all joints to be carefully soldered. Do all necessary flashing around chimneys, dormers, bay windows, porches, etc., also counterflash all chimneys and junctions. Slate the entire roof with 16″×8″, royal black slate, not less than 3″ lap. Put up where required three tin leaders, connected with drains where directed.

Piazza.—The sills and bearing timbers for porches to be 3″×6″, floor beams 2″×6″, placed 20″ from centers, notched into the sill and well nailed; the floors to be 1″ thick, 4½″ wide, laid in white lead and blind nailed. Steps to have 1¼″ treads and ⅞ risers; the roof to be ceiled and tinned; columns, plates, balusters, ceiling, etc., to be white pine, worked and trimmed as per details; the piazza to be ceiled on the under side, part raked and part on level, with 3″ beaded ceiling, ⅞ thick, beams, ″″×4″.

Blinds.—All windows, except cellar and attic, to have 1¼ outside blinds, made, hung, and fastened in the best manner, painted at the factory three coats. The bay in reception hall, dining room bay, parlor bay, and bay over hall to have Venetian blinds, with cornice made of stained wood, hung complete.

Exterior.—The water table, corner boards, cornice, window frames, bay windows, porches, and all other exterior ornamental work to be made of the best quality of white pine, in accordance with the drawings and details.

Window and Door Frames.—Window frames to be made for 1½″ double hung sash, with 1¼″ pulley and hanging stiles; 2″ sills and ⅞ subsills; 2″ axle pulleys, stops, etc., all complete. Small cellar frames to be made with rabbeted frames, cased inside, and hung at top with 3″ narrow butts and proper fastenings.

Door frames to be made of 1¼″ plank, with rabbeted jambs; outside doors to have 1¼″ outside casings.

Sashes.—All sashes, except cellar, to be 1½″ thick, dimensions and number of lights as shown in drawings; to be glazed with second quality French double thick glass; cellar to be glazed with third quality. The double hung sash to have best Russian hemp cord, proper weights, and Berlin bronze sash fasts, size and number as per plans. Window on stair platforms to be stained cathedral glass, leaded in, designs selected by the owner, to cost $1.25 per square foot.

Doors.—The front doors to be 2″ thick, moulded as per plans, upper panels to be glazed with stained cathedral glass, to cost $1.25 per sp. ft., selected by the owner, hung with 4½″ lacquered loose butts, fastened with 4½″ mortise lock; night latch attachment, brass face, wooden furniture and escutcheons, brass flush bolts top and bottom. Sliding doors, to roll on Hatfield's patent 4″ anti-friction sheaves, astragal face mortise locks, flush trimmings, bronze or brass. Closet doors 1¼″ thick, paneled and moulded one side, hung with 4″ lacquered butts, fastened with 4½″ mortise lock, wooden furniture, etc., for principal part of first story and hematite for second floors, white porcelain for kitchen, closet doors to have reverse bevel rim locks. All doors, where needed, to have rubber-tipped base pins and ash saddles.

Stairs.—Build the stairs as shown on the plans, from first to second story with 1¼″ treads, ⅞ risers, and 1¼″ strings, to be put up in the best manner; the steps to be wedged with glue and supported on strong carriage timbers. Newels, balusters, and hand rails to be made of cherry, as per details, all the treads and risers to be tongued and plowed together. Cellar stairs to be rough spruce plank steps housed into strings. The flight from second to third stories to be inclosed, as shown, with door at bottom hung complete. Fur off all soffits of stairs complete for lathing.

Trimmings.—The architraves for all doors and windows throughout the house to be made 5″ wide moulded on face. First and second stories to have turned corner blocks, the bases to be 7½″ wide, moulded on top. All to be of well seasoned and clear white pine.

Pantries.—Kitchen pantry to be fitted up with wide shelves on two sides as directed. China pantries also to be fitted up with shelves, doors, and drawers complete, as directed. Bed room closets to have one shelf with strip fitted with japanned hooks for coats and hats. All these shelves to rest on rabbeted cleats all around.

Kitchen Wash Trays, etc.—Wainscot kitchen 3′ 0″ high, 4′ 0″ behind sink, with narrow beaded yellow pine ceiling, with nosing and cove finish. Furnish and fit up in kitchen two wash trays made of 1½″ clear lumber, dadoed together with white lead, covers hung complete.

Bath Room.—Bath tub to have ash top; skirt the front of bath tub with narrow beaded ceiling. Wainscot bath room 2′ 0″ above the fittings all around, nosing and cove finish, ceil in front of wash bowl, and hang door complete, with catch. Put up water closet, with seat riser, and lid hung with brass butts.

Grading.—The owner will do all grading.

Mantels.—The dining room, parlor and one bedroom on second floor to be furnished with mantels and grates, of the prime cost in all, including setting, of $175, to be selected by the owner.

Cutting, etc.—Furnish and put up all necessary pipe boards for plumber to screw his pipes to, do all necessary cutting for gas fitters, plumbers, and heater men.

Picture Moulding.—Put up picture moulding in principal rooms, first and second stories and halls, wood to match that of rooms, 1½″ wide.

Back Panels.—All the windows on the principal part of first story and stair platforms to have panel backs and moulded stool, all other windows to have neat moulded stools and aprons. Furnish and hang a 5″ gong bell in front hall complete. The pull to match front door knobs.

Cellar Door.—Put up outside cellar door as shown, of narrow beaded ceiling, put together with wrought nails, hung and locked complete.

Hang Shelf.—Put up hang shelf in cellar where directed, of wide ceiling and good strong hangers, 2′ 6″ wide by 8′ long.

Coal Bins.—Put up coal bins where shown or directed, of planed hemlock boards and 3″×4″ stanchions, one bin for furnace coal and one for range, each to have small door for access.

Air Box.—Build cold air box as directed by the furnace man, of wide pine ceiling boards, with wire over entrance space through wall.

Painting.—All the exterior woodwork usually painted to be painted two good coats of white lead

and linseed oil paint, all knots and sap to be well shellacked before priming; all cracks, joints, and nail holes and over nail heads to be well puttied after priming is done. All tin work to have two coats of Prince's metallic paint; also paint the chimney two coats. All the colors to be selected by the owner. The blinds will be painted at the factory. The interior will be wood filled with Wheeler wood filler, then two good coats of hard oil finish. The first story and main stairs and balusters and rails will be rubbed down to a smooth surface. The second story will not be rubbed down. All the doors, saddles, hearth borders, and hard floors will be oiled; all sash and outside doors must be painted on top and bottom. The painters must follow immediately after the carpenters.

MASON'S SPECIFICATIONS.

Excavations.—Proper excavations of depth as shown on plans, or the cellar proper, to be about 4½′ deep, all piers and foundations 2′ 6″ deep. Stoop foundations 2′ 6″ deep, also footing course under foundations 4″ deep. Earth and rubbish to be removed where directed. All water that may accumulate during the excavation, from any cause whatever, to be removed at once and the premises kept dry.

Stonework.—The cellar walls to be hard burnt brick, those generally used in the vicinity, 8″ thick to the full height of cellar, which will be 7′ in the clear, and to be laid as shown in cement and lime mortar, with sharp sand, all to be neatly pointed inside and out, every seventh course to be headers. All angles and corners to be perfectly plumb and the walls level on top. Cement the entire cellar bottom with best Rosendale cement, gravel, and sharp sand, at least 3″ thick, well smoothed over on top, the cellar wall to be faced on both sides, the outside to be cemented from bottom up, foundation under walls to be solid grouting 4″ deep.

Brick Piers, etc.—Build brick piers where shown on plans, of good hard burnt Jersey brick, of dimensions indicated on plans. All piers outside to be excavated for at least 2′ 6″ deep, and filled in with small stone and well hammered down to a solid bed.

Stoop Stones.—Put down stoop stones where shown, with foundations at least 2′ 6″ deep and filled in with small stone; on this lay flags in two lengths and 2′ wide, to be full length of each and every stoop. Turn trimmer arches to all fireplaces. Furnish and set bluestone sills to all cellar windows. Furnish and set bluestone steps where shown with brick risers and stone cheeks and copings.

Chimneys, Flues, etc.—Build chimneys as shown on plans, of good hard burnt brick. The joints of all flues struck smooth and capped with bluestone caps, 3″ thick, with holes cut in. The kitchen fireplace jambs to be built of Trenton front brick, laid in red mortar. Furnish and set bluestone shelf, and hearth rubbed smooth for kitchen. Furnish and set three thimbles where directed.

Drain Pipe.—Connect a 4″ drain tile from inside of cellar wall to cesspool. Run 4″ drain tiles from leaders and connect with cesspool pipe at the nearest point.

Vault.—Excavate and build privy vault where directed, of brick 4′ deep, and to project back 2′ in rear, this opening to be covered with a box neatly fitted.

Plastering.—The entire house to be lathed and plastered, except cellar. The attic rooms and closets to be laid on with one coat and hard finished; all the others to be regular three coat work and all hard finished, except dining room, parlor, library, first and second story hall, also soffits of stairs. These to be sand finished in the regular way, and all done in the very best manner, using the best materials. The mortar to lie at least one week before using.

The mason will make all his work good after all other trades are done, and leave the building broom clean immediately after the plastering is done.

This specification is intended to cover all mason's work, to fit the building ready for occupancy as per plan, but should anything have been omitted necessary to that end, it must be done without extra charge.

PLUMBER'S SPECIFICATION.

Drain.—Furnish and put in where shown on the plans a 5″ cast iron soil drain pipe, to run from inside of building out to the tile drain, 4′ outside of the building.

Soil.—Furnish and connect with the soil drain in cellar a 4″ cast iron soil pipe, and run same size up and out of roof at least 4′, and cap the same with the "Smith" patent ventilating cap. Use Y branches for all waste connections. All the iron soil pipes to have a coat of asphaltum. The soil pipe to have a cleaning out cap in cellar.

Calking.—All joints of all iron pipes are to be thoroughly calked with picked oakum and molten lead and screwed in position with iron hooks. All joints between iron and lead pipes to be made with brass ferrules, to be calked into iron pipes, and the lead pipes to be soldered to it with wiped joints.

Boiler.—Furnish and put up where shown on the plans a 35 gallon round head, heavy pressure copper boiler, and provide with draw cock for emptying the boiler, and shut-off cocks for shutting off water from second story, and provide with circulating pipe, complete. Connect boiler draw cock with the sink waste, have a ⅝″ stop cock on the supply pipe and combined safe and vacuum valve on top of the boiler. Boiler to be supplied with a Lockwood stand.

Supply.—Tap and pay for tapping the water main, and connect a ⅝ *aaa* supply and run to the boiler. Supply to have a shut-off cock inside the cellar wall. All pipes are to be graded so they will drain perfectly dry—each floor to be controlled separately by shut-off cocks. Where pipes will not drain dry, put in small pet cock. Run a ⅝″ *aaa* lead pipe to and through cellar wall to a point where directed, and furnish and fit a stop cock both on the inside and outside of building.

Sink.—Furnish and set up where shown in the kitchen an 18″×30″ Mott's Eastlake galvanized iron sink, with back air chamber and iron legs, and supply with hot and cold water through ⅝″ *aaa* lead pipe and Fuller cocks, and have 1½″ X lead waste pipe, properly trapped and connected with the drain with a 2″ iron pipe to the main soil pipe. To have a cleaning cap on end of pipe under sink.

Bath.—Furnish and put up, where shown, a 16 oz. sheet copper bath tub, 5′ 6″ long, well tinned and planished. Supply with hot and cold water through ⅝″ AAA lead pipe and nickel plated combination bath cock with rubber spray, to have 1½″ X waste, and properly trapped and connected with the soil. Bath to have nickel plated plug and chain. Overflow to be connected with waste.

Bowl.—Furnish and set where shown on the plan a 14″ marble Italian ware wash bowl, with marble countersunk top and sub-bases, 10″ high. Supply with hot and cold water through ½″ AAA lead pipe and nickel plated Fuller patent basin cocks, to have 1¼″ X lead waste properly trapped and connected with the soil, to have nickel plated chain and stay and plug.

Air Chamber.—No cocks to be placed at the end of a line, but the pipe to be extended so as to form an air chamber.

Closet.—Furnish and set in the bath room where shown on plans, supplied with water through 1¼″ pipe from cistern above, an inodorous porcelain wash out closet with suitable size cistern. The cistern to have the flush tank attached. Supply through ⅝″ *aaa* pipe, and have cistern valve and rubber ball complete. Ventilate the closet with a 3″ lead pipe, connected with the iron vent. Closet cup and pull to be nickel plated, and to be inserted in the seat. Closet to have enamel drip tray.

Safe Pans.—The bath tub, bowl and closets are to be provided with 2½ lb. lead safe pans, edges turned up 2″ all around, and to have a ¾″ lead waste pipe to the cellar.

Wash Trays.—Supply the wash trays with hot and cold water through ⅝ *aaa* lead pipe and Fuller patent cocks, with flange and thimble. Provide with a 2″ main waste pipe, properly trapped and connected with main soil pipe, also all necessary plugs and chains and flanges, also provide on end of pipe a cleaning cap.

Ventilation.—Every trap through the house to be separately and independently ventilated from the crown by the same size as the trap.

Gas Pipe.—Put up the gas pipes with outlets where shown on the plans, and according to the rules of the gas light company. All outlets are to be capped and all pipes tested. All side lights are to be not less than 5′ 6″ from floor. All drop lights are to be hung plumb.

Range.—Furnish and set in kitchen a No. 70 Boynton's "Newport" range. Connect water back to boiler, fit smoke pipes, etc., complete; also furnish and fit in sheet iron throat pieces in chimney, with hole and slide complete.

Heater.—Furnish, and erect in a good, substantial, and workmanlike manner a No. 8 "Economy" warm air heater, with double casings, of J. F. Pease Furnace Co.'s manufacture, 206 Water Street, New York, to heat the first and second floors at 70° F. Provide Tuttle & Bailey's black japanned bordered registers of the following sizes: Hall, 10″×14″; parlor, 9″×12″; dining room, 9″×12″; chambers (three), 8″×10″; bath, 7″×10″.

The smoke pipe to be of galvanized iron, and all tin pipes to be IX bright charcoal tin. All tin pipes to have proper dampers near furnace, also patent damper in smoke pipe with regulating chains. Finish and complete the apparatus in all respects, and leave the same in perfect working order.

BILL OF MATERIALS.

1	girder	6″×10″×20′ =	100	sq. ft.
1	"	6″×10″×16′ =	80	"
1	piece	3″× 8″×19′ =	38	"
3	"	3″× 8″×14′ =	84	"
4	"	3″× 8″×18′ =	144	"
3	"	3″× 8″×16′ =	96	"
1	"	3″× 8″×19′ =	38	"
1	"	3″× 8″×13′ =	26	"
1	"	3″× 8″×14′ =	28	"
1	"	3″× 8″×20′ =	40	"
1	"	3″× 6″×21′ =	32	"
1	"	3″× 6″×19′ =	29	"
1	"	3″× 6″×22′ =	33	"
1	piece	3″× 6″×16′ =	24	sq. ft.
7	"	2″× 6″×16′ =	112	"
30	"	2″× 6″×18′ =	540	"
36	"	2″× 6″×12′ =	432	"
6	"	2″× 6″×22′ =	132	"
5	"	2″× 9″×18′ =	135	"
13	"	2″× 9″×26′ =	507	"
11	"	2″× 9″×24′ =	396	"
3	"	2″× 8″×12′ =	48	"
1	"	2″× 8″×22′ =	29	"
1	"	2″× 8″×16′ =	21	"
10	"	4″× 4″×12′ =	160	"
1	"	4″× 4″×20′ =	27	"
3	"	4″× 4″×15′ =	60	"
7	"	4″× 4″×16′ =	147	"
6	"	4″× 4″×14′ =	114	"
2	"	4″× 4″×18′ =	48	"
11	"	4″× 6″×22′ =	484	"
13	"	2″×10″×18′ =	390	"
32	"	2″×10″×26′ =	1,387	"
6	"	2″×10″×24′ =	240	"
6	"	2″×10″×12′ =	120	"
1	"	2″×10″×20′ =	32	"
2	"	2″×10″×17′ =	58	"
6	"	2″×10″×14′ =	140	"
4	"	2″×10″×28′ =	187	"

=6,730 sq. ft. At $19 per M, $127 87

300 pieces 2″×4″×12′ = 2,400 sq. ft.
300 " 2″×4″×13′ = 2,600 " =5,000 sq. ft. at $14 per M, 70 00

75 lineal feet, 1¼″×6″ rough spruce. 1 50
3,000 feet matched hemlock for sheathing bay and piazza roofs, at $19 per M..... 97 00
1,850 " 6″ siding at $25 per M..... 46 25
1,700 " rough sheathing for roof, at $14 per M..... 23 80
1,700 " slate, main roof, at 7 cents per foot.. 119 00
2,000 " No. 30 manila paper at..... 10 00
135 " main cornice ready to put up, at 25 cents per foot 33 75
400 " 1¼″×5″ corner boards, etc., at 4 cents per foot..... 16 00
175 " short gable cornice ready to put up, at 8 cents..... 14 00
500 " vertical shingling, 6 cents per foot... 30 00
125 " band cornice ready to put up, at 8 cents per foot..... 10 00
65 " piazza plate and cornice, at 18 cents per foot..... 11 70
120 " water table at 6 cents per foot..... 7 20
65 " piazza facia and cove, at 4 cents per foot..... 2 60
28 " front piazza rail, at 35 cents per foot. 9 80
15 " back piazza rail, at 20 cents per foot.. 3 00
28 " front front piazza filling, at 12 cents per foot..... 4 56
12 brackets front piazza, 12″×12″×2″, at 30 cents each..... 3 60
4 " back piazza, 12″×12″×2″, at 30 cents each..... 1 20
2 short posts, back stoop, at 75 cents each.. 1 50
3 brackets for bay windows, at $1 50 each.. 4 50
2 " front piazza gable, at 75 cents each 1 50
1 back piazza column 1 50
5 front piazza columns, at $1 75 each..... 8 75
3 stoops, ready to put up 13 00
325 feet piazza floor, at $35 per M..... 11 37
325 " piazza ceiling at $35 per M..... 11 37
Outside cellar door, ready to put up..... 4 00
45 feet lattice..... 12 00
6 finials, at 75 cents each..... 4 50
220 feet 20 ft. tin gutters and valleys, at 10 cents..... 22 00
300 " tin roof, at 6 cents per foot..... 18 00
75 " 3 ft. tin leader, at 12 cents per foot... 9 00
8 cellar windows complete, with sash ... 10 00
17 first story windows complete, at $9..... 153 00
Extra for Venetian blinds 30 00
15 second story windows complete, at $8 25.. 123 75
Nails, etc..... 35 00
11 third story windows complete, no blinds, $5 each..... 55 00
12 first story doors, complete, $6 50..... 78 00
10 second story doors, complete, at $5 50 each 55 00
3 third story doors, complete, at $3 50 each 10 50
300 feet picture moulding, at $1 50 per 100 feet..... 4 50
3,000 " flooring for three floors, at $25 per M. 75 00
275 " yellow pine floor, at 3½ cents per ft.. 9 62
40 " wainscot for kitchen, at 20 cents per foot..... 8 00
30 " wainscot for bathroom, at 20 cents per foot..... 6 00
Prepared material for two pantries..... 20 00
Prepared material for four closets..... 8 00
Main stairs..... 60 00
Attic stairs..... 15 00
Cellar stairs..... 4 00
Prepared materials for bathroom..... 6 00
Mantels..... 75 00

$1,607 19

Labor, putting up work	$600 00
Painting	160 00
Mason	750 00
Plumbing and gas	320 00
Heating	195 00
	$3,632 19

A TWELVE HUNDRED DOLLAR DOUBLE HOUSE.

The estimate for this house, in this vicinity, is $1,200—with superior finish, $1,400—but its cost will be less in some other places, where materials are cheaper.

SPECIFICATIONS.

The specifications and drawings are intended to co-operate, so that any work shown on the drawings and not mentioned in the specification, or *vice versa*, is to be executed the same as if mentioned in the specifications and set forth in the drawings, to the true intent and meaning of the said drawings and specifications, without extra charge.

The drawings taken in connection with this specification are intended to provide for the completion of the entire carpenter work, mason work, tinning, painting, etc., as well as everything mentioned in the specification.

Casings for doors and windows, ⅞″×4″; door jambs, 1¼″ thick, rabbeted. The casings to have ½″ bead on front edge; all the windows to have neat moulded stools and aprons. All windows to have stop beads, and to be hung on weights and cords. Sash, 1¼″ thick; number of lights, etc., as per plan, second quality French sheet glass. All room and front doors to be 1½″ thick, all other doors 1¼″ thick, and all four paneled, flush moulding. Build the stairs as shown, ⅞ treads, strings, and risers. Put down ash saddles to all doors. The upper flight of stairs to have hand rail; also level rail on second story. Rail, 2×3, moulded; balusters, ⅞×⅞ . newel, 4×4; all of ash. All 1½″ doors to have 4″ mortise locks; other doors to have 5″ rim locks. Put in shelving as shown, ⅞″ lumber, all resting on rabbeted cleats. Bedroom closets to have strips under shelves, with wardrobe hooks screwed on same; all windows to have approved window fastenings. Kitchen pantries to be five shelves high. Stoop floors to be ⅞″×4½″ white pine; porch ceiling, ⅞×4½ white pine, beaded. Build privy of wide ceiling boards, with seats, door, and a sash complete, with wood box under same, 3′ deep.

All the windows, first and second stories, to have outside rolling blinds, hung and fastened complete, when shut or open. The entire house to be sheathed with ship lapped sheathing, well nailed; put tar paper between ship lap and siding.

PAINTING.

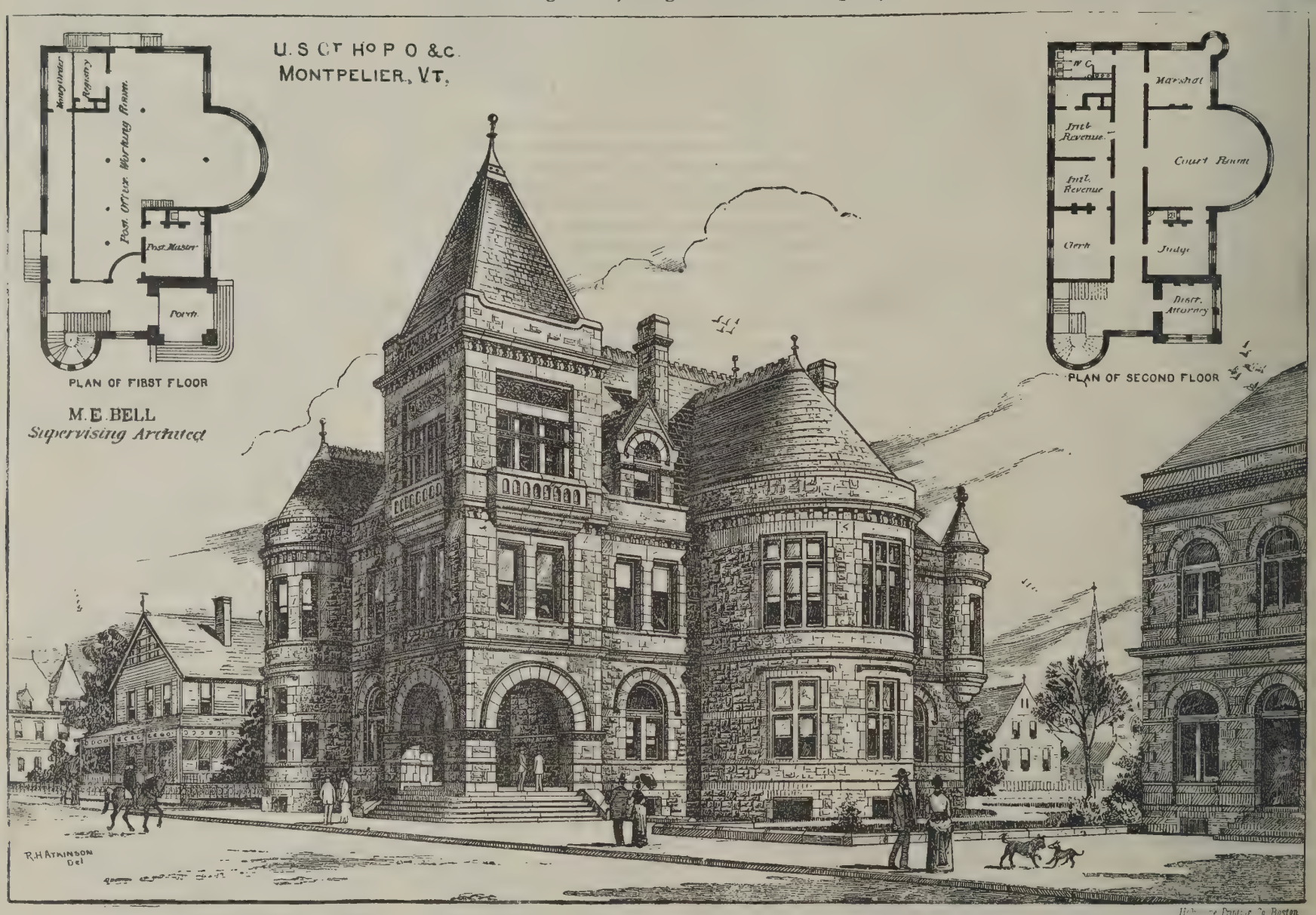
Paint the entire house, inside and out, including blinds, chimneys, two coats of good ready mixed paints, of such colors as may be selected. All sap and knots to be shellacked before trimming is done. Putty up all nail holes, etc., complete; paint all tin work two coats of Prince's metallic mineral paint; also paint privy same as house.

BILL OF ESTIMATES.

Lumber.				
50	2″×8″×24′	=1,600	sq. ft.	
2	2″×8″×22′	= 58	“	
4	4″×4″×16′	= 84	“	
28	2″×5″×16′	= 373	“	
18	2″×5″×12′	= 180	“	
14	2″×5″×20′	= 233	“	
13	2″×5″×12′	= 130	“	
4	3″×4″×24′	= 96	“	
2	3″×4″×22′	= 44	“	
200	2″×4″×16′	=2,007	“	=4,805 ft. timber, at per M.	$1 40	$67 27
2,000 ft. siding, per M.					20 00	40 00
14,000 1×8″ pine shingles, per M.					4 00	56 00
500 1×2 shingle lath and furring, each.					4	20 00
130 ft. water table, per lineal ft.					3	3 90
200 ft. double corner board, per lin. ft.					4	8 00
245 ft cornice, per lineal ft.					$0 12	$29 40
4 stoops, ready to erect						12 00
4 circles for piazzas						4 00
2,500 ft. flooring, per M.					20 00	50 00
4 cellar windows, complete						4 00
14 first story windows, complete, each					5 50	77 00
10 second story windows, complete, ea					5 50	55 00
16 first story doors, complete, each					4 25	68 00
14 second story doors, complete, each.					4 25	59 50
Main stairs, complete						25 00
Cellar stairs complete						3 00
400 ft. surbase, per ft.					3	12 00
Prepared materials for 2 pantries, 2 washrooms and 8 closets						10 00
Mantel shelves						2 50
Labor for constructing work						250 00
Mason work, complete						423 43
Painting						120 00
Total						$1,400 00

THE COURT HOUSE AND POST OFFICE, MONTPELIER, VT.

We give from the *American Architect* a view of the new Court House and Post Office, Montpelier, Vermont.



THE NEW UNITED STATES COURT HOUSE AND POST OFFICE, MONTPELIER, VERMONT.

MASON'S SPECIFICATION.

Excavation.—Excavate for cellar under rear part of house full width and as marked on cellar plan. The balance to have a trench wall, at least 2′ 6″ deep below grade. The cellar walls and underpinning to be an 8″ brick wall from bottom up, and the cellar to be 6′ 3″ high in the clear. All to be hard burnt brick. Build the chimneys, as shown on the plans, of hard burnt brick. Plaster the entire two stories, including the closets, with two coat work, skin finish. Furnish and set bluestone sills to all of the cellar windows.

CARPENTER'S SPECIFICATION.

All timber throughout to be pine. The floor beams, 2×8, 16″ on centers; rafters, 2×6″, 24″ on centers; studding, 2″×4″, 16″ on centers; partitions, 2″×4″, 16″ on centers; shingles for vertical sides and roof to be 18″ pine, laid on 1″×2″ shingle lath. The siding to be narrow novelty. Corner boards, 1¼″ ×3″; water table, 1½″×5½″; window frames, 1¼″×4″; outside casings; ⅞″ jambs; 1¼ main sill; ⅞″ subsill; and to have pockets and pulleys; door frames made in the usual way. Outside casings, 1¼″×4″, and 1¼″ jambs. Stoop treads, 1½″; risers, ⅞″; piazza columns, 5″×5″, boxed. Piazza rail, 3″×4″; balusters, 1¼″×2″; outside cellar steps, 2″×10″, pine timber. Outside cellar door to be made of wide ceiling boards with battens hung, and have padlock. Form cornice as shown. Gutter and valleys to be lined with tin 14″ wide; put up galvanized gutters where shown. Put in furring where required. Floors to be of matched pine boards. Bases, ⅞×5″, beaded.

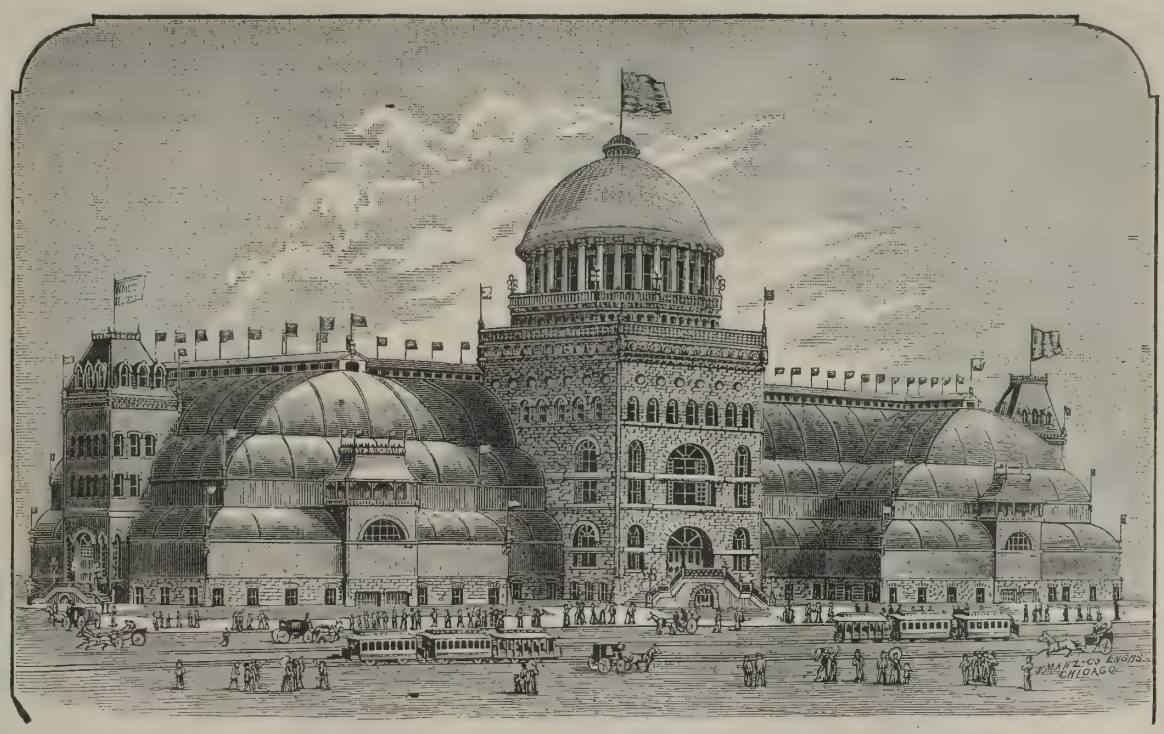
M. E. Bell, supervising architect. It is a pleasing design.

THE time which would be taken to discharge 500 gallons of water through a 1½ inch pipe 700 yards long, with a fall of 100 yards from inlet to outlet, is theoretically 16 minutes; but any inequality in the inside of the pipes, or minute obstructions, would increase the time.

THE NATIONAL AGRICULTURAL EXPOSITION.

An enterprise has been inaugurated in Kansas City which bids fair to become *the* event of the year in the West. The National Agricultural Exposition is a legitimate outgrowth of the location of Kansas City at the gateway of one of the largest and most productive agricultural areas in the whole country The Missouri Valley has been properly styled "The Egypt of America," on account of its corn-producing proclivity.

The exposition will give great prominence to the products of agriculture, and all the counties of Kansas and Missouri and many Western States will have special pavilions in which their particular products will be displayed at the exposition. The great Western lines of railroad centering at Kansas City have manifested a desire also to have separate exhibits. In addition to these, the mining department will be amply represented in the minerals from Colorado and New Mexico. The machinery department will not be neglected either, but every effort is being put forth to exhibit all the leading articles of American manufacture, and a wide variety of machinery in motion will be displayed in this department. It will be seen, from the picture of the exposition building which is published in this issue, that a really fine exposition structure is being erected for the purposes indicated. It will be constructed of brick, stone, iron, and glass, and will resemble somewhat the old Crystal Palace of London.



THE NATIONAL AGRICULTURAL EXPOSITION BUILDING AT KANSAS CITY.

The officers of the exposition are: James Goodin, president; Hamilton S. Wicks, vice-president and secretary; John W. Ryckman, manager; and F. J. W. Hart, architect. The building is under contract to be completed September 1, and work is being conducted by day and also at night, by the aid of electric light. The doors of the exposition will be thrown open to the public on September 15, and it will continue thereafter for forty-five days, closing November 1. Kansas City will enjoy quite a carnival season this fall, for, in addition to the exposition, there will be a grand trades parade display, similar to the Veiled Prophets of St. Louis. The exposition grounds are located on the east side of the city, on a beautiful tract of ground, reached by ample street car, cable, and railway accommodations.

The building in which the exhibition will be held is now in process of construction. Its dimensions will be 450 by 255 feet, three floors, with domes, towers, and other elegant appointments. It will have over six acres of floor space for exhibition purposes, and will be constructed of brick, stone, iron, and glass, in a most substantial manner, and at the same time will be a superb architectural ornament. Several commodious annexes will also occupy contiguous positions on the exposition grounds.

These grounds are sufficiently centrally located, yet they have ample room to accommodate all the outside pavilions and agricultural machinery and cattle exhibits that may apply.

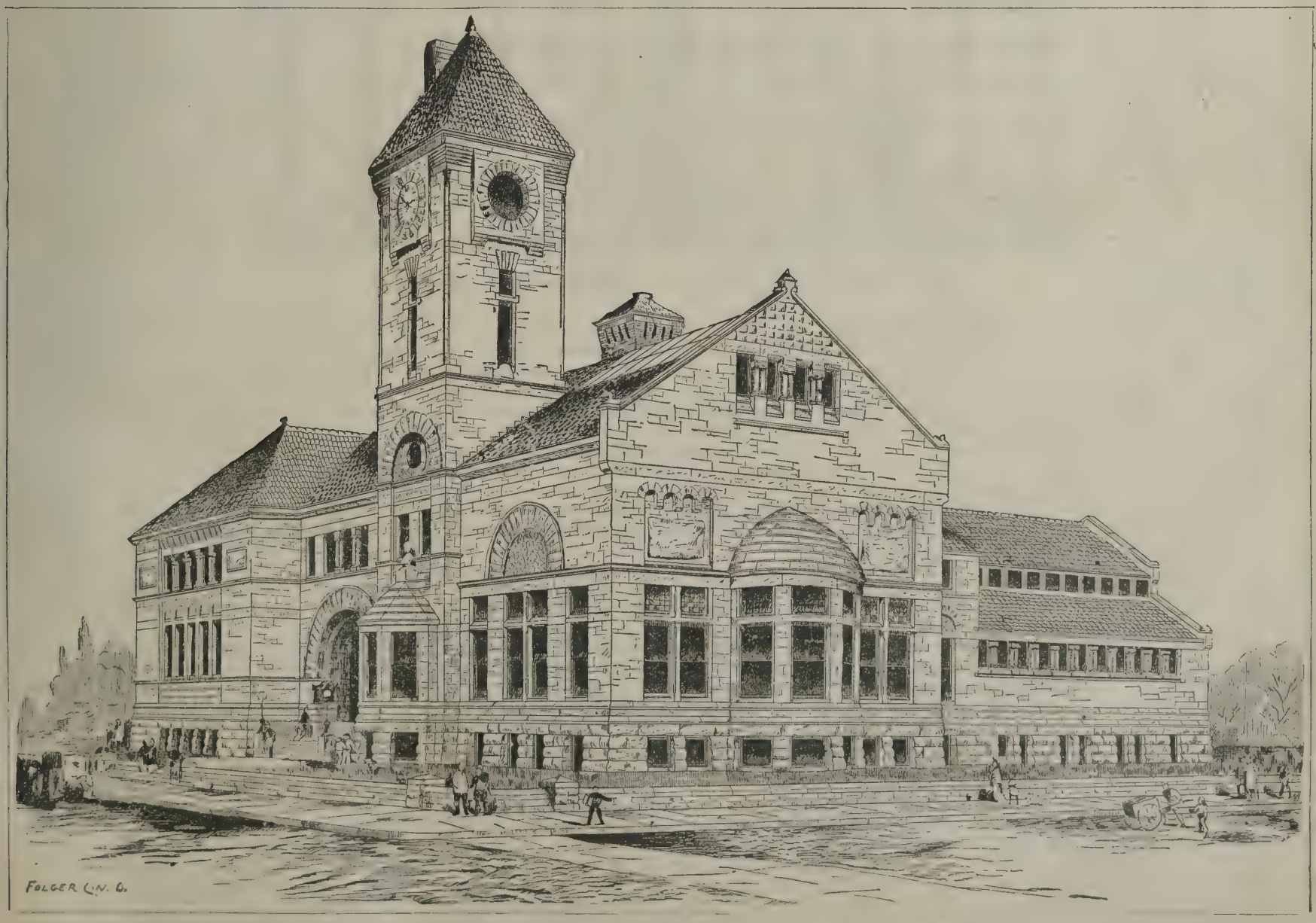
Items for Builders.

Three and a half barrels of lime will do one hundred square yards of plastering, using two coats. Two barrels of lime will do the same amount of plastering with one coat. One and a half bushels of hair will do a hundred square yards of plastering. One and a quarter yards of good sand will do a hundred square yards of plastering. One barrel of lime will lay one thousand bricks. Two barrels of lime will lay one cord of rubble stone. One half barrel of lime will lay one perch of rubble stone. One thousand shingles laid four inches to the weather will cover a hundred square feet of surface, and five pounds of shingle nails will fasten them on. One-fifth more siding and flooring is needed than the number of square feet of surface to be covered, because of the lap in the siding and matching. One thousand laths will cover seventy yards of surface, and eleven pounds of lath nails will nail them on. Eight bushels of good lime, sixteen bushels of sand, and one bushel of hair will make enough good mortar to plaster a hundred square yards. A cord of stone, three bushels of lime, and a cubic yard of sand will lay a hundred cubic feet of wall. Five courses of brick will lay one foot in height of a chimney. Sixteen bricks in a course will make a flue four inches long, and eight bricks in a course will make a flue eight inches wide and sixteen inches long.

THE CARNEGIE FREE LIBRARY, ALLEGHENY CITY, PA.

By the generous gift of Mr. Carnegie, the city of Allegheny is to be provided with a splendid library, and some of our architects have busied themselves in preparing designs for the structure. We present herewith the design of Mr. McLaughlin, for which we are indebted to the *Western Architect and Builder.*

It represents a noble edifice, and is highly creditable to the architect.



COMPETITIVE DESIGN FOR CARNEGIE FREE LIBRARY, ALLEGHENY CITY, PA.—JAS. W. McLAUGHLIN, ARCH., CINCINNATI, O.

THE COGSWELL POLYTECHNIC COLLEGE.

A few weeks since we chronicled the fact that Dr. Henry D. Cogswell, of this city, had donated property worth $1,000,000 to found a technical school where our boys and girls may prepare themselves for the trades and vocations of life. On this page we give the elevation of the main building of this new institute of learning, the plans of which were drawn by Chas. Geddes, the architect. The structure will be of pressed brick with stone trimmings. It is to be located on the lot corner of Folsom and Twenty-sixth Streets, with a frontage of 245 feet on the first named street and 182 feet on the latter.

The building will be three stories high, and from its imposing and substantial appearance will be the most notable structure in the southwestern portion of the city. It will be 71 feet in width by 85 feet in depth, not including the projections. On each side will be a wing two stories in height, each 35×40 feet. The building will be surmounted with a high roof, covered with ornamental metal Queen Anne shingles, and have handsome cresting on the ridges. In front a high tower rises to the height of 127 feet, the apex topped with a revolving crystal star set in a copper pinnacle. On the face of the tower, above the third story line, will be the dial of a clock, and still lower down will be the name of the school. The main entrance is spacious and surrounded with a wide porch. On each side of the door is a niche for the placing of pieces of statuary. There are also two side entrances—one for boys and the other for girls. The main entrance porch is approached by a broad flight of stone steps. The main hallway is 10 feet wide, and opens into a cross hallway 12 feet wide, which crosses the building from end to end. From the cross hall, stairways lead to the second story. Stairs also lead to the stage at the rear and to the front of the assembly hall, in the story above. It will thus be seen that the means of egress are unusually excellent, there being three wide doorways from the ground floor to the street and two from the second story to the assembly hall.

There are to be ten classrooms, each 28×30 feet, four to be on the main floor and the other six to be in the second story. On the first floor, also, will be the offices of the president and secretary, a reception parlor, a library 16×28 feet, and a museum 20×28 feet, besides a number of dressing and toilet rooms. A spacious assembly hall occupies the entire third story. It is 68×70 feet in size and will have a seating capacity for 1,000. It will be used for the delivery of scientific and other lectures in connection with the regular courses of study in the school. This hall is to be handsomely furnished and provided with a stage with all the necessary adjuncts for completeness. All the rooms are well lighted, and every appliance known to modern skill will be introduced to make ventilation perfect. They are to be lighted with electricity, and electric bells and speaking tubes will be run throughout the structure.

A short distance in the rear of the main edifice will be another building, in which the shops and laboratories are to be fitted up. It will face to the north and be 152 feet in length by 40 feet wide, and two stories in height. The ground floor will be devoted exclusively to ironwork, both designing and moulding, having departments for filing, fitting, and chipping. A labora tory will be established in a room 35×40 feet, and fitted with all the essentials for thorough instruction in polishing, fitting, and setting up of various pieces and descriptions of machinery. A machine tool laboratory will be 40×40 feet in size, and completely equipped with iron lathes, a drill press, planers, and rollers, by the aid of which pupils will be instructed in the arts of turning, drilling, and planing iron, so that they will be qualified to construct tools and small pieces of machinery. A forging furnace and laboratory will also be established and occupy a space 40×40 feet. The founding laboratory will be 35×40 feet in size, and contain a furnace and other necessary appliances.

The second floor will be devoted to the chemical, wood, and physical departments. The carpentry department will be 40×35 feet, and be supplied with an extensive assortment of tools. A wood-turning factory will be 40×40 feet, and be supplied with lathes, a planer, a circular saw, a band saw, a mortise machine, a moulder, and several other machines. The remaining space on the floor will be at the disposal of the physical and chemical departments. One room, 20×20 feet in size, will be fitted up with shelving inclosed in a glass front, where all the philosophical apparatus will be kept that is used in experiments in chemistry and physical instruction. The furnaces in connection with this department will be in an adjoining room, 40×50 feet in size.

The department for the instruction of girls will be fully as complete in detail as that for the boys. Here instruction will be given in wood and metal carving, sewing, cutting, and fitting, as well as other mechanical studies. In the basement will be well lighted lunch rooms for the boys and girls; also rooms for the janitors and others who will reside permanently on the premises. There is also some additional space which may be utilized for class rooms or shops that may hereafter be required or found desirable. All the departments of machinery will receive motive power from a seventy-five horse power horizontal engine, which, together with the boilers, will be of the most approved pattern.

In connection with the instruction in the mechanical arts and sciences, a four years' course of instruction will be given to those pupils who may so desire. The course will include a thorough English education, together with German, Spanish, and French. Arithmetic, geometry, and algebra will be embraced in the English course, and special attention given to all branches that may in any manner be deemed essential to the many mechanical pursuits. A course will also be given in mechanical and architectural drawing, embracing both free hand and perspective. Business forms, single and double entry bookkeeping, telegraphy, phonography, commercial law and correspondence, will also receive special attention. A notable feature of the college will be its recognition of the coming education for the preparation of progressive teachers.

The school will be open to the boys and girls of this city and State who may have completed the third grammar grade in the public schools. Tuition will be absolutely free, the endowment of the college being fully provided for by the donation of its generous founder.

The cost of the buildings alone will be some $85,000, and the machinery and tools $25,000 or $30,000 more. The school will be under the personal management of James G. Kennedy, as president, and Mrs. M. E. Arnold, vice-president, who have already been engaged to fill those two important positions. Mr. Kennedy supervised all the plans of the building, and many details were suggested by him. As soon as the construction of the building is fairly under way, Mr. Kennedy will go East and visit institutions of a similar nature, study the methods of work, and ascertain just what will be needed in the shape of machinery and scientific appliances to make the school all that it should be, and all that its generous and thoughtful founder wishes to make it.—*Mining and Scientific Press.*

THE COGSWELL POLYTECHNIC COLLEGE, SAN FRANCISCO.

Roofing Slate.

The roofing slate quarried by E. J. Johnson at his quarry (the "Bangor Central"), situated at Bangor, Pa., has made such a high reputation for its superior qualities that he is compelled to largely increase the output in order to supply the demand for this brand of slate. If parties building will always insist on having "*Bangor Central*" roofing slate, they may rest assured they are securing the best quality of slate in the market.

Any information pertaining to slate roofing will be cheerfully furnished by Mr. Johnson. Prices will be quoted, delivered to any point in the United States.

All correspondence should be addressed to E. J. Johnson, 18 Burling Slip, New York.

A Woodpecker's Sugar Bush.

I have detected one of our yellow bellied woodpeckers, *Picus varius*, tapping a maple tree for the sake of the sap. Attracted to my window by a vigorous hammering, I saw a beautiful male bird sinking a shaft near the base of a large maple. It struck me as being a discouraging place to bore for grubs, as the tree was healthy and the sounds from the tapping gave no evidence of hollowness; so I thought at first it might be a case of misguided instinct, or perhaps merely an experimental bore. As soon as one hole was completed, another was begun, and by the time that was done, the sap had commenced to flow freely from the first. It was then I noticed that it was the sweet sap the fellow was after, and not with the hope of any other reward that the bore was made, for, as the sap flowed, it was sipped up, first from the first hole, and then from the second, and meanwhile, between drinks, the little fellow was vigorously at work upon a third excavation. When this was done, and all three taps flowing profusely, his sweet tongue was not yet sated, but his scarlet head was kept bobbing to and fro, sipping the sap from the three holes, while he energetically started a fourth. This completed, and all four taps well under way, his whole attention was, for a few moments, devoted to his sugar bush, until, at length satisfied, he flew off—possibly to get a pickle!—J. W. Clark, Albany, N. Y.—*Swiss Cross.*

Preservation of Woodwork.

It is said to have been settled by practical and repeated tests that petroleum is an excellent preservative for shingles, lattice work, the timber parts of tools and machinery, and all wood exposed to the weather. A producer and user of petroleum gives as the result of his experience the information that fresh, light petroleum, if applied warm, will penetrate dry wood almost as readily as water, and when it is thoroughly saturated the condition is permanent, water having no effect upon it, as can readily be conceived. He has never found a board or piece of timber about the petroleum works, which he has been running for years, where it came in contact with the oil, that did not remain sound; but where no oil had touched, there were decayed places, and the decomposition was rapid when it had once set in. A wooden storage tank, which was taken apart after eighteen years' service, exposed to all kinds of weather, did not show a rotten spot anywhere, every board being sound. Oil barrels and small tanks have been known to have been covered with a thin layer of earth, in one case for fourteen years, and to have come out sound. Where the sills of barns and similar structures have been saturated with petroleum, they have outlasted any other part of the frame. After the first two or three days it is said the application does not expose the wood to increased risk from fire.—*N. W. Lumberman.*

A Car Load.

An American car load of twenty thousand pounds will contain the following:

70 barrels of salt, 70 of lime, 90 of flour, 70 of whisky, 200 sacks of flour, 6 cords of wood, 15 to 20 head of cattle, 50 to 60 head of hogs, 80 to 100 head of sheep, 6,000 feet of solid boards, 340 bushels of wheat, 400 bushels of corn, 680 bushels of oats, 400 bushels of barley, 360 bushels of flaxseed, 360 of apples, 430 of white potatoes, 1,000 of bran, 130 to 190 of eggs, and 200 kegs of nails.

A FORTY-FIVE HUNDRED DOLLAR DWELLING.

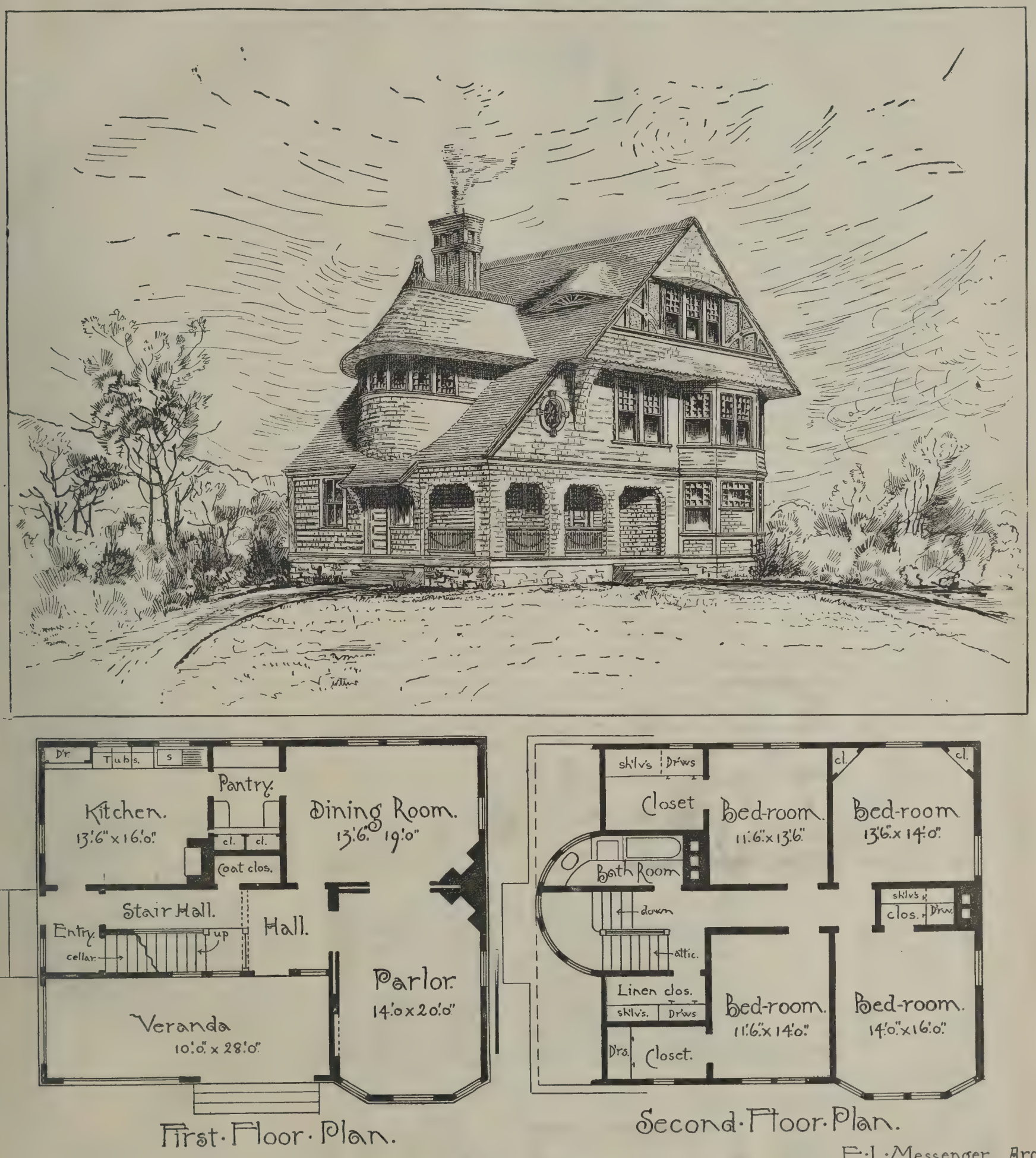
We give the perspective and plans for a house costing about $4,500, designed by E. L. Messenger, architect, Orange Valley, N. J. Is a convenient and comfortable dwelling.

Sand in Plaster.

In Paris the mode of using plaster is to employ it pure and free from mixture. The very low price at which it is sold and the comparatively high price of sand dispense with the motives of economy which render mixtures almost indispensable in our case. While the practice in France is to use plaster pure, I am disposed to think that the mixture of sand, so far from being prejudicial, is even desirable, if confined within reasonable limits. We find that in reassuming the state of hydrated sulphate of lime the plaster goes through an imperfect crystallization, and this action is accompanied by a singular rearrangement of the molecules. This causes the plaster to swell when used alone, and to such an extent that it is impossible even to finish a ceiling close up to a wall at once. Now, the introduction of a body so full of inequalities as the coarse, sharp sands must afford room for the free action of this expansion; and, at the same time, the facets of the sand must offer, as it were, nuclei which cannot but be favorable to the crystallization. It is, doubtless, on these principles that we can explain the superiority of the plaster containing wood breeze, which does become harder than the purer plasters if used alone. Too large a proportion of sand should be avoided; but very fair work can be executed even with a mixture in the proportions of two of sand and one of plaster. Under any circumstances the finishing coat should be pure. Subsequent experience will decide whether the use of two materials of this kind does not expose the work to unequal contractions, likely to cause fissures or cracks.—*G. R. Burnell.*

One Safe Theater.

The new Flemish theater in Brussels will afford every guarantee of safety which the most timid playgoer could desire. The materials employed in its construction are stone and iron; and, though it will be impossible to dispense with woodwork altogether on the stage, all the timber used will first be rendered absolutely incombustible. Two broad flights of stairs, one at each side of the main entrance, lead to the grand circle and the *foyer*, which are on the first floor. The three upper tiers have each its own independent stair way opening directly on the street. The building is provided with twelve different outlets—nine for the egress of the spectators and three for that of the *personnel*. But the most original feature in the construction is the system of external balconies or outer galleries, corresponding to those in the interior of the building, with which they communicate by no fewer than a hundred different doors—twenty-five to each tier. These balconies are further connected with each other by iron stairs of good width and easy descent, and the lowest of the four is capacious enough to give standing room to the entire audience.—*St. James' Gazette.*



A FORTY-FIVE HUNDRED DOLLAR DWELLING.

AN ENGLISH DOUBLE HOUSE.

We give, from the *Building News*, illustrations of an English double house of the cottage style, and moderate cost. The estimate for construction here is $3,000 in stone and $2,200 in wood.

How to Increase Your Wages.

Every thinker knows that the man who would succeed must do more work than he gets paid for, in every profession and trade. We take it for granted that the man who will do only twenty dollars' worth of work a week because his salary is but twenty dollars will never get more than twenty dollars a week, for the simple reason that he has never shown his employer that he is worth more. We figure it that an employe who means to succeed has to do from ten to twenty per cent more work than he gets actual pay for. This he has to do until he reaches a certain point, and having reached that point, he will find that by as much as his income has increased by so much has the demand for amount and intensity of his labor diminished. To put this theory into figures, we will say that a boy receiving three dollars a week should do four dollars' worth of work; the boy receiving five dollars a week should do seven dollars' worth of work; when he gets to be a man and receives twenty dollars a week, he should do thirty dollars' worth of work; a man receiving thirty dollars should do forty dollars' worth of work, and so on until, say, the salary reaches seventy-five dollars, and then the laborer can give himself somewhat of a rest—that is to say, about fifty dollars' worth of work will satisfy his employer. Labor brings its market value, and is seldom overpaid, oftener underpaid. It is the experience, the "know how," that brings the money.—*Philadelphia Ledger.*

Good Water Promotes Good Health.

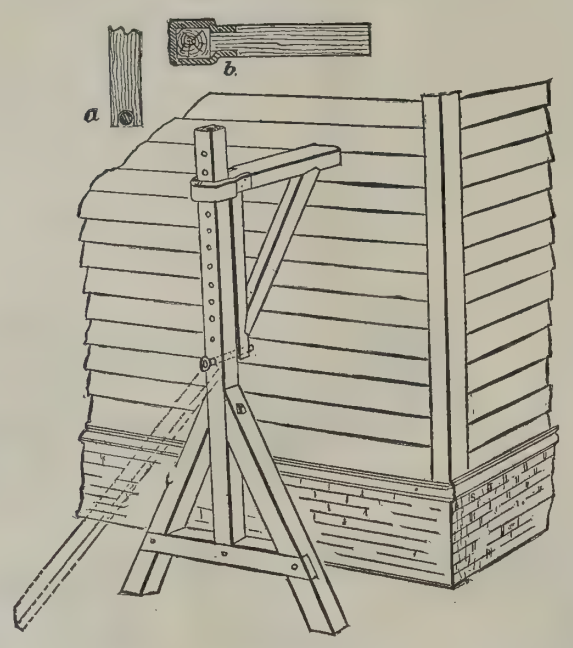
Hoboken formerly shared the water supply of Jersey City, but in 1882 changed to an independent supply drawn from the Hackensack River at New Milford. For the seven years (1875–81) previous to this change, the total average death rate of Hoboken was 26·9 per 1,000, against 23·5 for Jersey City, or a comparative excess of 3·4 per 1,000—a result which might be expected, other things being equal, since the site of Hoboken is naturally more unhealthy than that of Jersey City. But for the five years (1882–86) following the change of water supply, the death rate of Hoboken was but 22·6, against 22·9 for Jersey City, a gain upon Jersey City's rate of 0·3 per 1,000, or a total change and saving to Hoboken of 4·3 lives per 1,000 annually. Further, the average rate per 1,000 per year for the first quarter of 1887 is, Hoboken 20 deaths, Jersey City 22·73 deaths per 1,000; while the April report of the Hudson County health board gives death rates as follows: Jersey City 22·6, Hoboken 18·9 per 1,000. In other words, Jersey City's annual death rate under the use of Passaic water has remained practically steady at about 23 per 1,000 for the past twelve years, while Hoboken's rate has been steadily decreasing since purer water has been introduced, having fallen from a long annual average of 26·9 to an actual return at the rate of 18·9 for a single month, or a difference of 8 lives per 1,000 per year—a decrease of 30 per cent.—*Fire and Water.*

A PORTABLE SCAFFOLDING.

To the Editor of the Scientific American:

I send you a sketch of a portable scaffolding I use in my work in suburban building. I find it convenient and saving of considerable lumber and time in effecting changes, which can be done by two men around the whole of a building in half an hour, and this without splitting lumber or using nails.

The sketch will indicate the general construction of



the scaffold, which consists of the main upright standard, about 3 in. by 4 in., and of any desired length, supported on the two legs, spreading some 6 feet, and strengthened by the horizontal brace, the parts being bolted together or connected in some other convenient manner. The bracket is formed of 2″×3″ and 2″×2″ stuff and is from 3½ to 4½ feet long on the upper arm. To this arm is attached an iron yoke (as shown at *b* in the sketch), which slides up and down the standard. The bracket is supported on a one-half inch iron pin, passing through holes in the standard, the end of the upright being slotted as shown at *b*.

As a rule, I use 1½ in. planks for scaffold boards, placed upon the horizontal arm of the bracket. The scaffold is supported by leaning against the building, the weigh on the boards throwing it in that direction, while the spreading legs entirely prevent it falling sideways. If it should be thought necessary in any particular case, a strut might be placed at the back, as shown by dotted lines, to prevent its falling in that direction. but this is rarely required.

When it is desired to alter the position of the scaffold, it is not necessary to remove the boards. One man takes a pole, and. placing it beneath the bracket, raises it sufficiently to clear the pin, while another man takes the pin out and places it in a higher or lower position in the standard as may be required.

This scaffold can be used for any description of building, and effects a considerable saving.

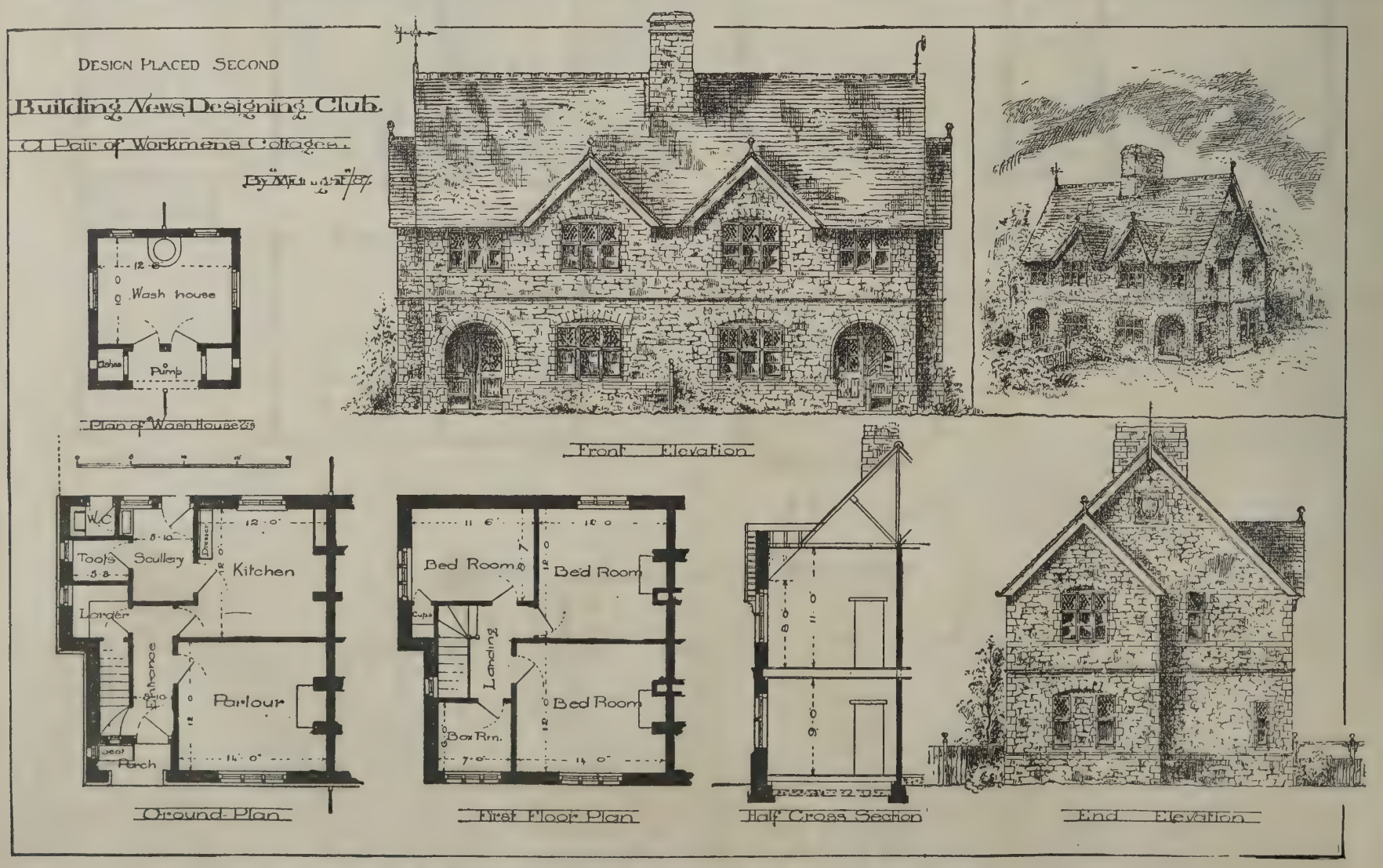
C. J. Dietrich.

La Grange, Ill.

A New York House.

The Marquand house is situated in Madison Avenue, and, as the name implies, is the residence of Mr. H. G. Marquand. Externally the house may be described as French Renaissance in character, though in detail this style is not adhered to. It is quiet and unpretentious in general effect, the lower part being of warm-colored sandstone, while the upper portion is built of red brick with stone dressings, and the roof covered with green slates. The main entrance is at the side, with outside steps leading to open porch, the ceiling of which is formed of richly colored old tiles from Spain, set in panels. The door opens into an ante-hall, which has a high dado of dark color, with a deep frieze of gold forming the background for figure decoration. It contains upholstered seats, and from it are two wide doorways, one leading to the guest stairs, the other to the hall. These guest stairs give access to retiring rooms, which are in close proximity to the first gallery of the hall and the main staircase. The larger hall, which may be called Renaissance in design, is the full height of house, and lighted from roof, with staircase of light oak, having richly carved notch board, and at each floor level a gallery with open balustrade. On the walls of part of the lower portion are panels of fine old Moresque tiles, with the intervening spaces covered with old Spanish leather. Valuable old English and other tapestries cover portions of the wall space, and on the higher landings large pictures are hung. For the furnishing of the hall old English carved oak has been used, a finely carved center table from Chester being a prominent feature. In the fireplace is a large dog grate, and in the spandrel of the first flight of stairs is small fernery and miniature waterfall and fountain.

At the right hand side of hall is the entrance to the salon, which is designed and carried out on the basis of the Greek style. It is an oblong apartment, with the door in the center of the long side, windows at one end, and the fireplace at the other. Opposite the entrance is a recess, divided from room by marble pillars, and through glazed openings behind may be seen a small conservatory filled with flowering plants and ferns. Round the room is a low dado of polished, warm-colored marble, formed in panels. The architraves and linings to recesses of windows are of warm, yellow-toned marble, moulded and carved, and round the whole room a sculptured statuary marble frieze extends, which was executed in Rome by eminent Ital-



AN ENGLISH DOUBLE COTTAGE OF MODERATE COST.

ian sculptors. The walls are hung with silvery gray silk, forming the background to many valuable pictures, including works by Rembrandt and other old masters, together with works by Alma Tadema, R.A., including his "Reading of Homer." In the center of ceiling is large panel, with beautiful figures on a gold ground, painted by Sir Frederic Leighton, P.R.A. This formed his most important contribution to the exhibition of the Royal Academy last year. Round it, as the center, is paneling of cedar wood, oiled, so as to be of dark tone. The open fireplace has a marble mantel the full height of the room, with classic busts in the panels of the upper part, and on the parquet floor are fine skins.

The exquisite furniture for this salon was made in England, being designed by Alma Tadema to harmonize with the general style of the room. It is all very elaborate and distinctively Greek in form, with the framing generally of ebony, beautifully inlaid with carved ivories and mother-of-pearl and boxwood; the mouldings and carvings are particularly refined and delicate. The long settees and chairs have coverings of silvery gray silk, embroidered with patterns which are reproductions of classic examples.

The grand piano is similarly made and inlaid, and the music cabinet is a magnificent piece of furniture. There are two tripod tables, with Algerian onyx tops of great beauty.

The conservatory, which leads from the salon, is filled with ferns and flowering plants, arranged on ornamental rockwork, over which run streamlets with miniature pools and waterfalls, all very effectively lighted in the evening by electric lights. The windows are elaborately painted with Renaissance designs, so as to obscure the view from the avenue.

A small withdrawing room from the salon is a wondrously beautiful example *a la* Alhambra. The mantelpiece is of delicately colored marble, richly carved, and the walls, greatly enriched in low relief, are decorated in cream and gold, with frieze and ceiling of old Moresque tiles of magnificent color, set in panels. Some pieces of low-toned, but gorgeous, lusterware pottery aid the chaste and rich effect of the room.

Again entering the hall, a large doorway on the opposite side to the salon entrance leads to the parlor, which is bewildering in its richness and lavish profusion. Here the style chosen is Japanese of a very pronounced type, and carried out with close attention to detail. It is a perfect marvel of ingenuity and quaint conceits, magnificently carried out. Mr. Marquand has for many years been an ardent collector of Japanese curios, old carved ivories, wondrous specimens of lacquer work, embroideries, pottery, etc., and these have been incorporated in the design. The room is oblong, with bay window at one end and fireplace in semi-recess at other.

The walls at side for about seven feet high have continuous open cabinets made of "quebrache wood," from Brazil. This wood, when polished, is of a dull terra cotta red color, and is one of the very hardest obtainable. There is great difficulty in working it, but this has not been taken into consideration in the design, which is crowded to the utmost with elaborate detail—cut and carved and moulded with infinite variety. Recesses of various sizes are formed, panels of lacquer work being let in the backs. In these recesses are placed rich and rare Japanese and Chinese pottery, mostly vases of beautiful and curious forms, and of rich self-colors—turquoise and celadon perhaps prevailing.

The fireplace in recess at end is a wonderful piece of design and a marvel of work. It almost defies description, and it must suffice to say that it would be utterly impossible to elaborate it further than it is at present. Some splendid old Japanese bronzes have been incorporated in the design with excellent effect. At the side is a richly stained glass window, painted in strong and vigorous colors by La Farge, and illuminated from behind by the electric light.

Round the room is deep frieze of specially manufactured silk, which was embroidered in Japan. The ceiling is of paneled wood. Richly embroidered silks of beautiful and delicate colors are used as hangings, and in the furniture the Japanese feeling has been carried out; but comfort has not been sacrificed. Altogether the room is quite unique, and at every turn there is an astonishing amount of variety and interest.

En suite with this gorgeous parlor is the dining room, which has been designed and decorated after the manner of the Elizabethan houses in England. The room is wainscoted, and in the large, open fireplace is old fashioned dog grate. The furniture is all in the same style, darkened oak being used throughout, and to insure accuracy of form and detail the whole of the appointments were sent from England, special care having been taken to follow old examples in the designs.

Service to the dining room is from the butler's pantry adjoining it, as is usual in almost all American houses. Here the fittings are of polished mahogany, while all the conveniences for working are of the most complete description. The kitchens, etc., are in the sub-basement, and are fit adjuncts to the house, marble being freely used and the walls tiled.

On the first floor and throughout the house the same lavish profusion reigns. The library and boudoir, though not quite so striking as the apartments already described, are richly decorated and splendidly appointed. The principal sleeping apartments are very elaborate, with beautifully finished dressing and bath rooms adjoining. Each of these suites of rooms is finished in a different style, as much care having been exercised in them as in the reception rooms. They are fitted and finished in various kinds of wood, the walls hung, in many cases, with old and costly silks, or richly decorated by well known American artists. On the walls of the rooms and corridor are valuable etchings and engravings, besides many water colors from English exhibitions. The numerous fixed wardrobes or clothes closets are fitted up with cedar wood.

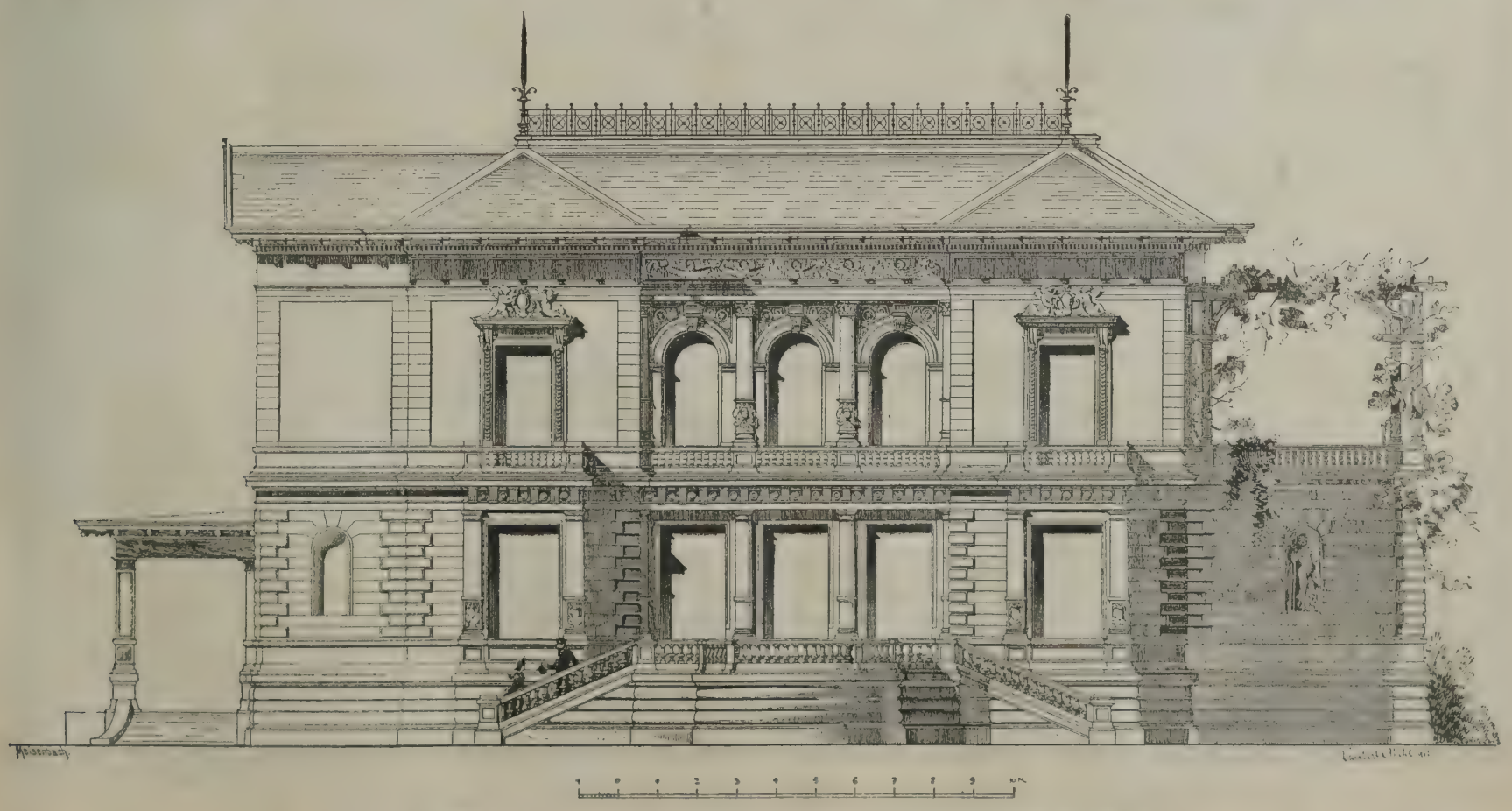
Mr. R. M. Hunt, of New York, was the architect of the Marquand house.—*John B. Gass, A.R.I.B.A., Building News.*

Etruscan Tombs.

Etruscan sepulchral chambers resemble very closely the early crypts, by which they probably may have been suggested. Like the tombs of the Greeks, they were always below ground. In fact, where this was difficult to accomplish from the flatness of the country, a circular apartment was built, and the earth piled over it so as to completely cover it. The Greek tomb was generally a sort of chamber to inclose the body, sometimes a mere stone coffin, sometimes very like our own family vaults, but without the arch. The Etruscan tomb, on the contrary, was the banqueting hall of the departed spirits. Hewn out of the solid rock, the ceiling was nevertheless carved to resemble the timber rafters of a chamber, the walls paneled like wainscot. Benches, armchairs, footstools, tables, all hewn from the solid rock, fill the chambers, while the walls are hung with weapons and tripods, lamps and other utensils lie about, and the panels are filled with pictorial representations and stucco figures. There is, in fact, little doubt that the Etruscan subterranean chamber was a complete copy, in design, decoration, and arrangement, of an Etruscan dwelling house. A plan and interior view of the famous tomb at Tarquinii, commonly called that of the Cardinal, is given by Canina. The plan is that of a square chamber, cut out of the solid rock, the ceiling or roof of which is supported by four solid piers, strongly resembling that of some of the early mediæval crypts.—*A. Ashpitel.*

A CONTINENTAL COTTAGE.

Our engraving shows the Helbing Villa, in Wandsbeck, built by Puttfarcken and Janda, architects, of Hamburg. Built in 1885. In the basement are the kitchen, storerooms, etc. On the first floor are the living and drawing rooms, dining room, etc., and the upper story contains only sleeping rooms. The owners gave positive directions for the arrangement of the plans, according to which seven rooms of the first floor were to be connected, in consequence of which the entrance and the vestibule had to be included in one room. The building is finished in cement and has a wooden roof. The interior is finished in the richest manner; the hall being completed in stucco, and the dining room, billiard room, and gentlemen's rooms are provided with wooden panels and wooden ceilings. The ceilings of the other rooms are plastered and richly frescoed. All the furniture and decorations were made from plans drawn by the architects. The cost of the building is about $40,000, and of the furniture about $20,000.—*Architektonische Rundschau.*



A CONTINENTAL COTTAGE—PUTTFARCKEN & JANDA, ARCHITECTS.

FLOORS AND CEILINGS: ANCIENT AND MODERN.

BY C. POWELL KARR, C.E., CONSULTING ARCHITECT, NEW YORK.

(*Continued from page* 136.)

IV.—THE FLOOR COVERINGS OF JAPAN.

Japanese house mats, *tatami*, are as neat, refined, and soft a covering for the floor as the finest Axminster carpet. Miss Bird gives their dimensions as 5 ft. 9 in. long by 3 ft. broad and 2½ in. thick. The dimensions generally given are 6 ft. long by 3 ft. broad. The frame is solidly made of coarse straw, matted and bound together, and this is covered with very fine woven matting, as nearly white as possible, and each mat is usually bound with dark blue cloth. Professor Morse says the edges are trimmed true and square, and the two longer sides are bordered on the upper surface and edge with a strip of black linen an inch or more in width. The surface of these mats in rooms, and mattings of the best quality in general, are made of the *Juncus effusus* (the pith of which is used for candles and lamp wicks in the province of Oomi), of the *Isolepis* in Bingo, and of the *Cyperus rotundus* in Satsuma and Bingo.

Fig. 6.—A CARD PARTY.

For the common mattings, rice straw and also different kinds of rushes are used. For the benefit of botanical readers, we append their names: *Scirpus lacustris*, *L. hydropirium latifolium Griseb.*, and *typha*. These plants grow almost everywhere. Temples and rooms are measured by the number of mats they contain, and rooms must be built for the mats, as they are never cut to fit the rooms. They are always level with the polished grooves or ledges which surround the floor. They are soft and elastic, and the finer qualities are exceedingly beautiful. They are as expensive as the best Brussels carpet, and the Japanese take great pride in them. One of the drawbacks connected with this very thickness, which accounts somewhat for their softness, is the place of refuge which they offer to myriads of fleas.

The Japanese architect invariably plans his rooms to contain a given number of mats. According to Professor Morse, the rooms are planned to contain mats in the following numbers: two, three, four and one-half, six, eight, ten, twelve, fourteen, sixteen, etc. In the two-mat room, the mats are laid side by side. In the three-mat room, the mats may be laid side by side, or two mats one way and the third mat crosswise at the end. In the four and one-half mat room, the mats are laid with the half mat in one corner. The six and eight mat rooms are the most common sized rooms. This will serve to indicate the Japanese fondness for littleness. In the illustration of a design for a twelve-mat room, if the two mats at the right and left hand ends be omitted, the remaining mats will be properly arranged for an eight-mat room, or twelve by twelve feet.

The six-mat room would be nine by twelve feet In adjusting mats to the floor, the corners of four mats are never allowed to come together, but are arranged so that the corners of two mats abut against the side of a third. They are supposed to be arranged in the direction of a closely wound spiral.

In the houses of nobles, says Professor Morse, the border strip of black linen has figures worked upon its face in black and white. The mats fit tightly. The floor upon which they rest is generally made of rough boards, with open joints. As you step, the mat yields slightly to the pressure of your foot. Old mats become slightly uneven and hard from usage. Shoes are invariably left at the door or entrance to the house, as it is considered a mark of great impropriety to wear shoes in a house. The hard heel of a boot or shoe not only leaves indentations on the upper surface of these soft mats, but it crushes and breaks the straw body of the mats, and would rapidly ruin them. Upon these mats the people eat, sleep, and die. They represent the bed, chair, lounge, and sometimes table, combined. In resting upon them, the Japanese assumes a kneeling position. A very good view of this position is shown in our illustration, Fig. 6, "A Card Party," where a profile of the figure in the foreground represents it admirably. The legs are doubled up at the knee, the haunches resting upon the calves of the legs and the inner sides of the heels, the toes being turned in so that the upper and outer part of the instep bears directly on the mats. It is only with a great deal of practice that a foreigner can become accustomed to this position. In this attitude they receive their friends at ceremonious repasts, as shown in our drawing, Fig. 7, which is a *cha-no-yu*, or tea party, showing all the participants in the kneeling position alluded to. The little black boxes in the illustration are the *hibachi*, made of wood, and contain a small earthen vessel for holding hot coals. In the making of the tea the utensils are used in a most precise and formal manner. The tea ceremonies have had a profound influence on many Japanese arts. Professor Morse has given us a very interesting description of the ceremonious etiquette observed in conducting them. In the study of a design for a twelve-mat room, which we show in Fig. 8, the illustration indicates merely the geometric design. The outside border of mats, six in number, are composed of a fine light orange colored straw, bound on the long edges by a deep blue band of cloth an inch wide. The basket work mats at either side of the center piece are in light dove color, of the same general tone as the border mats. The dark squares noticeable near the corners are plaited in with a decided dark gray straw. In the two center mats, which are so designed as to appear like one mat instead of two, the four deeply outlined small squares are woven separately of old turkey blue colored straws, lined with bands of bright yellow finely plaited straws. The border line of the two center mats is interplaited, as indicated in the design, with black and orange colored straws, the intervening space consisting of two rows all around, excepting where intercepted by the four little squares, and adjoining the border just described, is plaited in a dark dove colored straw. The large square, which is apparently in the center of the two central mats, is arranged into two patterns, diagonally, as indicated in the design. The upper right hand diagonal half is in black and yellow straws,

Fig. 7.—A CEREMONIOUS TEA PARTY.

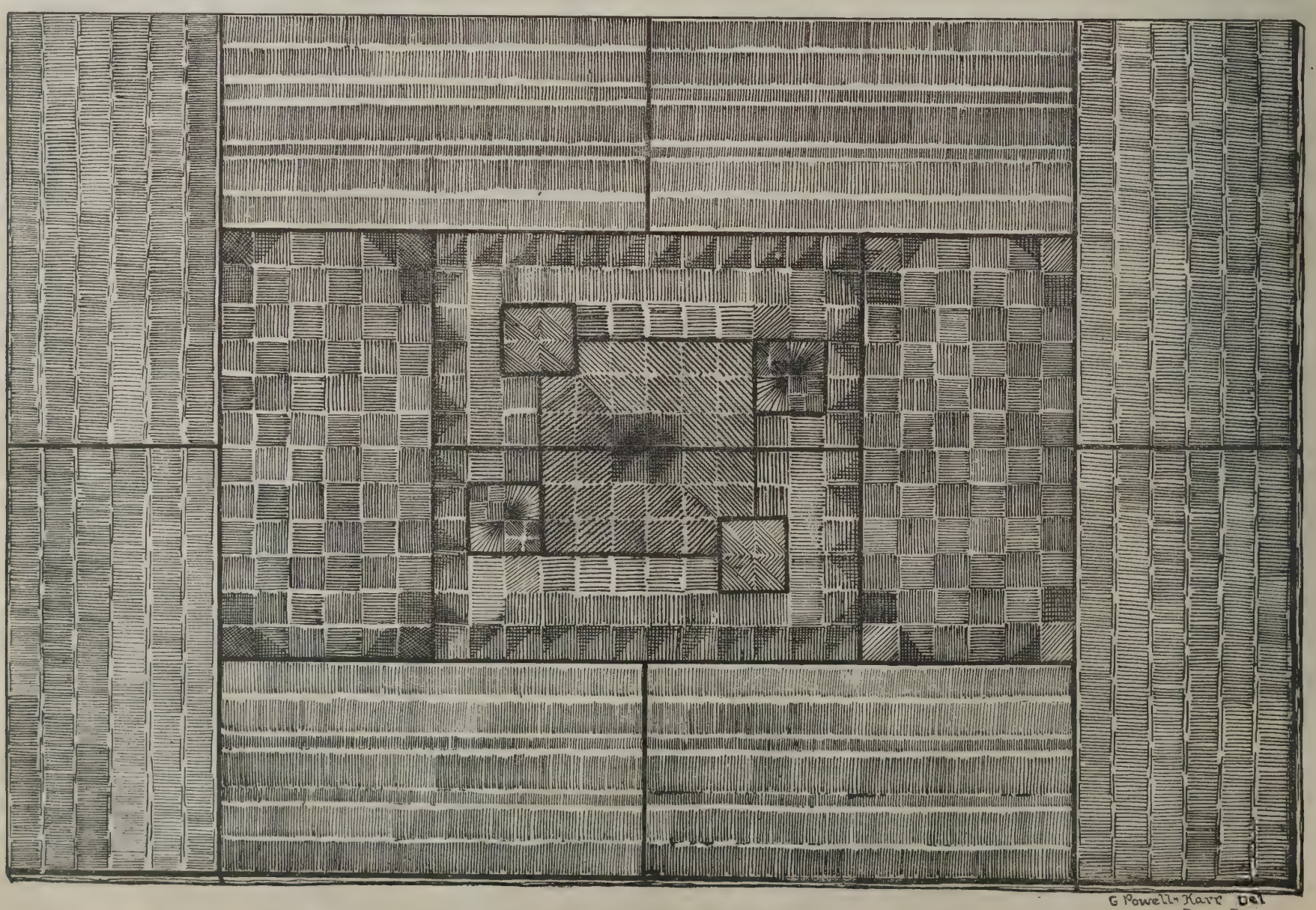


Fig. 8.—STUDY OF A DESIGN FOR A TWELVE-MAT ROOM.—BY C. POWELL KARR, ARCH.

alternately arranged, and the lower left half is in blue and yellow plaitings, and in the center square of all on the upper side, yellow pierces the black half diamond by interplaiting, and on the lower half blue pierces yellow, the shaded quarter points being yellow.

The size of room corresponding to this number of mats is 18 ft. by 12 ft. In the above design, the high lights are struck in the orange and yellows, the shadows in the black and grays, and the harmonizing tones in the dove shades.

In Japan a good quality of mats can be made for one dollar and a half apiece, though they sometimes cost three or four dollars, and even a higher price for a special design. The poorest mats will sell from sixty to eighty cents each. No description can do justice to the beauty of the plaiting, the dexterous workmanship, the luxurious yielding to the foot as it presses onward in a stride, for our impressions of a mat are derived from the coarse Chinese mattings, with which all of us are more or less familiar. To name the two types of mattings in the same breath is to vulgarize the one and refine the other.

The floors of most rooms are permanently covered with mats, and, as a consequence, the material is of rough boards, and laid without consideration as to regularity. In this way very poor lumber is used, and wide spaces between the boards are not inadmissible. In halls or vestibules the floor is composed of wide planks and the surfaces are polished and glassy, and kept so with remarkable skill. Polished wood floors in portions of front rooms are quite common in country houses and in many instances reflections of surrounding objects may be seen mirrored in their burnished faces. In country inns, the floor in the forward part of the house is sometimes laid with plank. In merchants' houses, bordering the street, the matted floor, according to Professor Morse, properly terminates a few feet within the sill, the space between being of earth. The floor being raised, the space between the edge of the floor and the earth is generally filled with plain panels of wood, though sometimes designs of flowers or conventional figures are cut in the panels. The kitchens, in every case, have wood floors, as do the halls, verandas, and all passageways. The ground beneath the floor is, in the houses of the better class, prepared with gravel and mortar mixed with clay, or macadamized.

APPARATUS FOR TESTING LIME AND CEMENTS.

The apparatus herewith figured permits of rigorously establishing the relations that exist between the progress of solidification of hydraulic products and the different phases of their manufacture. It permits likewise of comparing the products with each other as regards initial energy, and that too at every instant for several days. Finally, by means of this little instrument, it is possible to establish certain relations between the initial behavior of a product and its ultimate resistance.

The figure represents the apparatus reduced one-half. The device consists of a hollow rod weighing an ounce and a half, which slides without friction in a tube provided at the base with a disk 1¼ inch in diameter. The tube is provided at the side with an adjusting screw that prevents the rod from sliding. The rod is terminated beneath by a steel needle of 0·04 inch section and one inch in length. Besides this, it is provided above with a shoulder that permits of its weight being progressively increased by placing on it disks of zinc, each weighing an ounce and a half.

If the apparatus be placed upon a plane, hard, horizontal surface, and the screw be slowly and progressively loosened, the extremity of the needle will come into contact with the plane surface, and the zero of the vernier will coincide with that of the divisions in millimeters of the rod.

The face of the rod that touches the extremity of the screw is inclined upon the longitudinal axis in such a way that the descent is always slow and progressive in measure as the screw is loosened.

The apparatus is used as follows: The soft paste is put into a mould, and made to assume the form of the latter. At the moment the test is to be made, the hardened paste is removed from the mould and placed in a convenient position for operating. The zeros coinciding, and the needle being unloaded, the apparatus is placed upon the hardened paste, and held thereon by slightly pressing the disk with the thumb and forefinger of the left hand, placed each side of the tube. The screw is gradually loosened, and the reading n is made. Then the screw is tightened, and, without moving the left hand, the needle is loaded with m disks with the right hand. Then the screw is slowly loosened, and the reading N is made. $N - n$ will be the depth of penetration at 50 m grammes (1½ m ounce), and 5 $(m + 1)$ the pressure due to the needle per square centimeter (0·155 square

It is possible to effect the following results with this apparatus:

(1.) To determine the progress of the setting of a cement as a function of the time and weight, and thus obtain a diagram analogous to that shown in No. 1 (Fig. 2).

(2.) To determine the penetration as a function of the time, the weight of the needle being fixed; and thus obtain a diagram similar to that in No. 2.

(3.) To determine the penetration as a function of the weight after fixed periods; and obtain a diagram analogous to No. 3.

From a practical standpoint, diagram No. 1 evidently presents the most interest. To learn when the setting begins, nothing but the 1½ ounce rod withdrawn from the tube will be used. The setting begins when, the rod being placed quickly on the paste, the friction

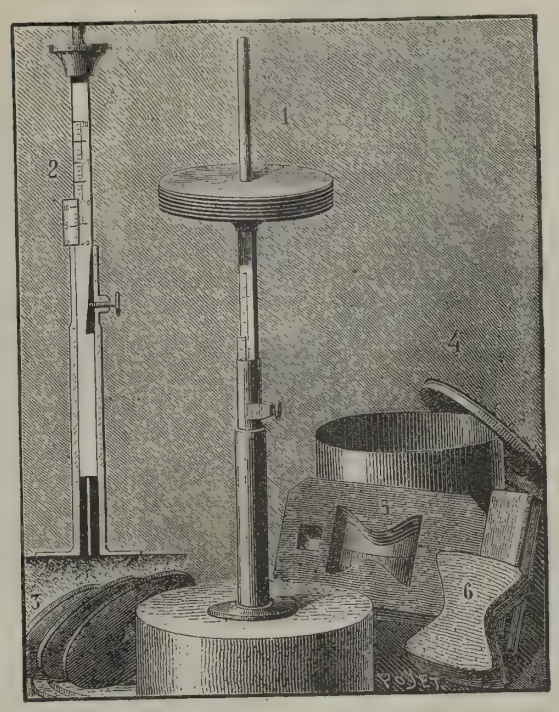


Fig. 1.—APPARATUS FOR TESTING CEMENT.

due to the nascent cohesion prevents it from entering the paste completely.

In Fig. 1, 1 is a general view of the apparatus; 2, details of the device; 3, disks; 4, box for the latter; 5 and 6, mould and core.—*La Nature.*

THE HOME OF MILTON.

CHALFONT ST. GILES AND MILTON.

The quiet rural village of Chalfont St. Giles, in Buckinghamshire, eight miles north of Uxbridge, was the retreat of John Milton in 1665, when the great plague raged in London. It is twenty-one miles from London

The early Friends or "Quakers" had personal and local connections with that neighborhood, and Thos. Ellwood, whose very interesting autobiography has lately been republished in Prof. Henry Morley's series of the "Universal Library," engaged a "putty box" at Chalfont for the temporary dwelling of the blind immortal poet.

Milton's town residence, at that time, was in Jewin Street, Aldersgate, and he was then composing "Paradise Lost." He finished this poem at Chalfont, and Ellwood, who had invited him there, invited him to begin the sequel, "Paradise Regained."

The cottage shown among our sketches of Chalfont St. Giles is the only house now remaining which Milton is known to have occupied.

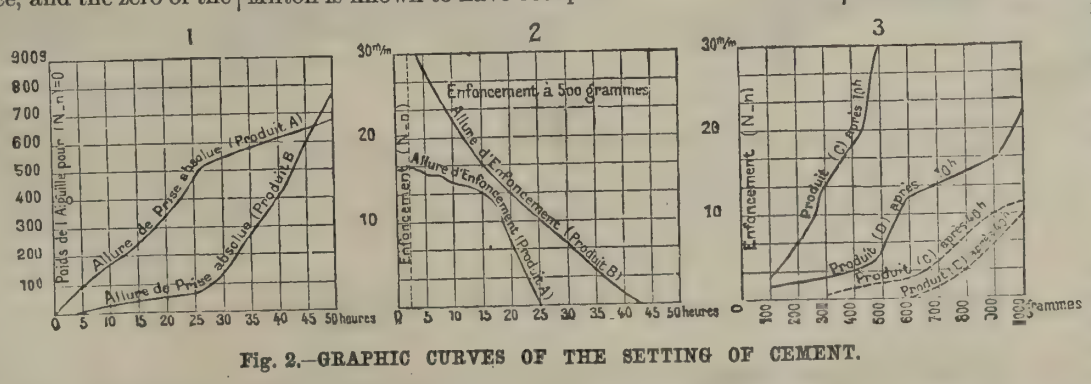


Fig. 2.—GRAPHIC CURVES OF THE SETTING OF CEMENT.

Mr. Laurence Hertlon tells us, in his "Literary Landmarks of London," that although John Milton was born and died in the metropolis, received part of his education and was thrice married there, and lived in many houses, within the bills of mortality, there is left to-day hardly a trace of anything that he touched or that is in any way associated with him.

He was born in Bread Street, Cheapside, in December, 1608, and was baptized in the church of All Hallows. Both house and church were destroyed by the fire of London in 1666.

As a boy he was sent to St. Paul's School, which also vanished in the conflagration of 1666.

After graduating at Cambridge and taking a Continental tour, Milton returned to London in 1639, and hired lodgings in St. Bride's Churchyard.

The house remained intact until 1824, when it was burned down, being at the time occupied by a hairdresser. Milton removed to Aldersgate Street, but no vestige of the house occupied by him there now remains. His next removal was in 1644, to the Barbican, where he afforded shelter to his first wife's relations, who were royalists.

The house No. 17 Barbican was in existence so late as 1864. A modern warehouse now occupies its site

From the Barbican, Milton repaired in 1646, to a small house on Holborn, opening backward into Lincoln's Inn Fields.

It was too remote from Whitehall to suit Cromwell's convenience, to whom Milton was then secretary. The Lord Protector summoned the poet to Scotland Yard, whence he migrated to a pretty garden house in "Petty France," Westminster.

The site forms part of the lawn of Queen Anne's mansions. An old tree was shown which he was said to have planted with his own hand.

In the house at Westminster, Milton lost the use of his eyes.

He was driven from it in 1660, upon the restoration of Charles II., which forced him to take shelter in Bartholomew Close, Duke Street, Aldersgate.

Before long he could return to Holborn, where he took a house in Red Lion Fields, now Red Lion Square.

His next move was to Jewin Street, Aldersgate, where he lived with his third wife and his daughters. The Jewin Street of that day has also passed away.

The declining years of Milton's life were passed in Artillery Walk, Dunfield Fields, where he dictated to his daughters his "Paradise Regained" and "Samson Agonistes."

Here he died in 1674.

The house of two centuries since has entirely disappeared. The nearest approach to Artillery Walk, in name, is Artillery Place, Bunhill Row.

The remains of the great poet were consigned to the chancel of St. Giles, Cripplegate, where a monument has been erected.

The Rev. Pownoll W. Phillips, Rector of Chalfont St. Giles, Mr. James Gurney, and Mr. S. Sanders are trustees of Milton's cottage, which has, with the cottage adjoining, been obtained at a fair price from the owners, Mr. and Mrs. Tomson, of Sandhurst. The trustees, with Mr. T. Newland Allen, lord of the manor, and Colonel Phipps and Mr. W. Gurney, church wardens, form a committee to provide for its preservation.

Their intention is to set apart Milton's cottage as a reading room and museum for objects connected with the poet, and for other matters of historic interest to the parish and neighborhood.

A fund has been instituted to enable them to pay for the cottages, to repair them, and to maintain them for these purposes.

The sum of £400 or £500 is required, and subscriptions may be sent to the rector or church wardens, or may be paid to the London and Westminster Bank, 1 St. James' Square, S. W., to the account of the hon. orable treasurer of the "Chalfont St. Giles Jubilee Milton Memorial Fund," Samuel Sanders, Esq., J. P., of The Grove, Chalfont St. Giles, Bucks, and 7 De Vere Gardens, South Kensington.

As the intention to use part of one of the cottages as a reading room and museum has been adversely criticised, it should be explained that this particular use of the house is necessary, owing to the law of mortmain; but every care will be taken to prevent injury to the building. A reading and recreation room already exists in the village.

The cottage would not be kept as Milton left it, if it remained as an ordinary village dwelling, to be occupied by a laborer's family.

Our illustration of Milton's cottage, page 51, is copied from a drawing from Mr. Wilfrid Ball. —*Illustrated London News.*

Whitewash and Fire.

Whitewash has many uses, political and moral (or immoral rather), as well as economic. But as a fire extinguisher it has not been hitherto generally recognized here. "Do you know," said a scientific gentleman the other day, "that it is next to impossible to burn a whitewashed fence? And do you know further, that in France, to protect the frame and interior of other buildings from fire, the walls, beams, joists, and the underside of floorings are thickly coated with lime wash before they are placed in position? It is so, and if this course were adopted here it would save many a house, many a village, from destruction. I do not mean to say that it will prevent the spread of a fire once under great headway, but from its uninflammable character, it is a guard against the prime ignition that often leads to dire results." This little hint set the writer to inquiring, and the doctor's words were confirmed.—*Am. Analyst.*

Why Pipes Burst.

The principal cause for burst pipes is frost. Water has the greatest density, that is, it occupies the least space, at a temperature 39·2° F. Above that temperature it expands, and below that temperature it expands until it reaches the freezing point, 32°. When the freezing point is reached, the water begins to solidify, until all the heat is expelled and ice is formed. The water has expanded nine per cent. in the operation. Below the freezing point, the ice contracts again.

After the first freezing occurs and the pipe is swelling, the ice next to the pipe contracts or breaks, and allows more water to come in contact with it. This, in turn, freezes, expands, swells the pipe a little more, and then contracts. This operation is continued until the pipe bursts. When this occurs, there is a movement of the softer ice to the break, and the space left fills with water and freezes, thus enlarging the fissure a great deal. This soft ice frequently runs out on the pipe and forms icicles.

This expansion of water may be illustrated by taking a basin even full of water and exposing it to a temperature lower than the freezing point. When the temperature of the water reaches 39·2°, it begins to expand, and will run over until it is frozen. After the surface is frozen, the solidification of the lower portion of the water causes the center to rise above the level—a phenomenon which is often seen. The mere fact that water when frozen is less dense than when liquid is proved by the floating of ice.

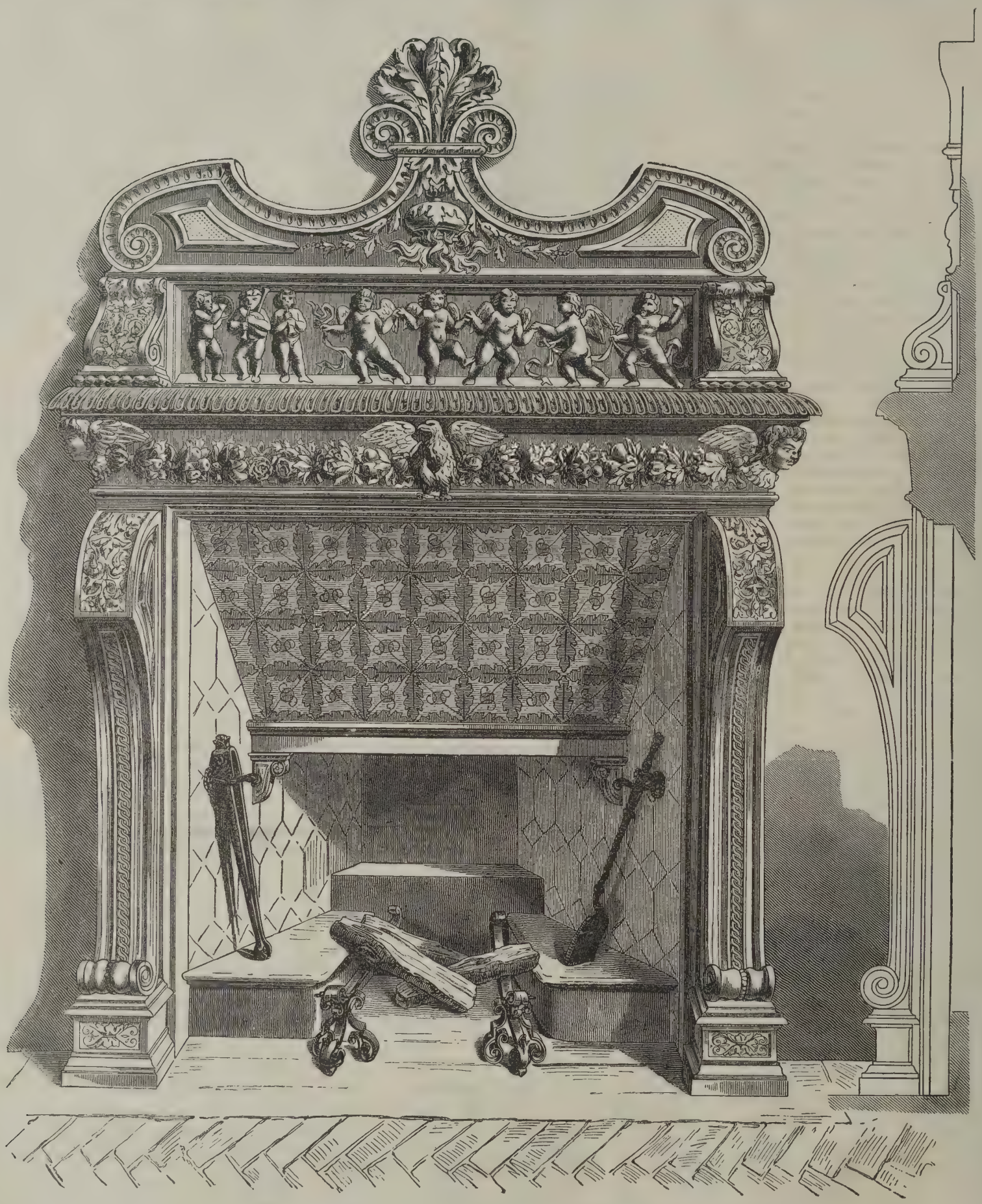
Another cause for the bursting of lead pipe is water hammer. Under direct pressure systems of water supply, the water hammer is sometimes very forcible, and its continuation often develops a burst at some weak point in the pipe. A remedy to prevent this consists of a rubber cushion, which gradually breaks the force of the blow.—*Sanitary News.*

How Lamp Chimneys are Made.

First they use pure white sand, found in but few localities, which, when thoroughly washed and dried, is almost white as snow. Then the potash (purified) and the lead, in the form of oxide, perfectly pure, are added to the sand, and thoroughly mixed until the batch resembles ordinary sugar in grain, but is quite red in color. It is now ready to go into the pots—twenty-four in number, made of a peculiar kind of clay, being from 42 to 48 inches in height and about the same in width. These pots are closed at the top to prevent the fire from injuring the melted glass, with the mouth on the side near the top. The furnace being circular, the pots when placed in position, and covered with fire brick, present their open mouths only, and when looked into resemble a hot summer's sun.

When in this condition, the pot is filled with the mixture above mentioned, closed tight, and in about twenty-four hours is ready for work. A workman called a gatherer dips his pipe into the melted mass, and gathers enough on its end to make a chimney. This he rolls on a smooth iron plate to get it evenly on end of pipe, when he blows it about the size of a boy's top, and hands it to another workman, who further blows it up, and proceeds to make the lower part of the chimney, which fits the burner. This he does by forming a small knob on the end of the now pear-shaped bulb, giving it a sharp stroke with his shears, breaking the knob off, leaving a small hole in the bottom of the bulb.

It is now heated red hot again, and the lower end of the chimney formed by the blower whirling and spreading the glass with a tool resembling sheep shears, but longer and narrower blades. The chimney is now broken off the pipe and put into a "snap," an instrument which holds it as one would clutch an apple firmly in the hand, and heated red hot. The top is finished by machinery.—*Cin. Grocer.*



DESIGN FOR A MARBLE FIREPLACE.

A COTTAGE OF MODERATE COST.

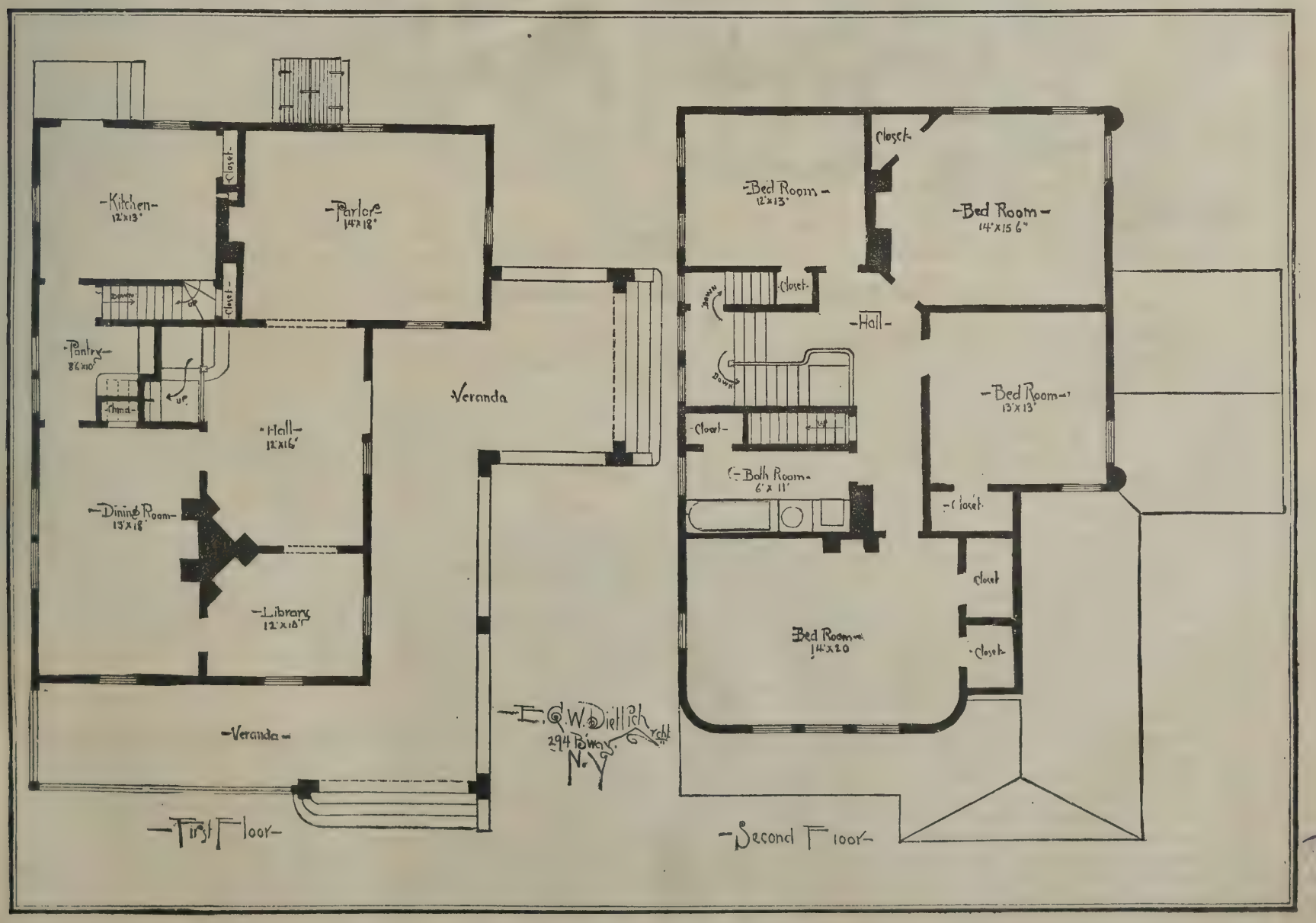
Our plate exhibits a cottage designed by E. G. W. Dietrich, architect, N. Y. Our engravings are from the *Builder and Woodworker*. About five thousand dollars is our estimate for the cost of this dwelling. This is a very handsome structure, cozy and homelike.

The Largest Vase in the World.

Whatever supremacy may be truthfully claimed by America in the line of all kinds of implements, watches, and jewelry, England leads the world in the line of art pottery. A well known English manufacturer of pottery has the honor of producing the largest and one of the most beautiful vases in the world. This vase consists of a pedestal, which, rising from a square plinth, supports a globe representing the earth surmounted by a figure of Ceres, who, together with a group of cupids, are showering gifts of fruitfulness upon the earth. Around the center of the globe runs a frieze, divided into four panels, on which are cupids, busy in the pursuits typical of the four seasons. The subjects are separated by bracelets, on which are other figures emblematic of the season. The pedestal contains a splendid frieze, on which are represented something more than sixty cupids occupied in rural work. The plinth is artistically ornamented in keeping with the general design. The color of the globe is a shade of green called celadon, the figures are china bisque, and the other decorations white china.

The whole stands eleven feet in height, and the diameter is six feet four inches, and, notwithstanding its proportions, this vase is elegant, chaste, and thoroughly artistic. The cost of this huge ornamented piece of pottery is $16,500.

A RURAL novelty has been introduced into France, and is called a plant tent. It is of quite fairy-like dimensions, something like a lamp shade or toy parasol, which is placed over delicate young plants as a protection against hoar frost and hail. The cost of a thousand is but 50s., and the device should be useful to place over young tobacco plants, or many other delicate nurslings transplanted from frame beds into open gardens.



A COTTAGE OF MODERATE COST.

A CHURCH OF MODERATE COST.

We give a design for a church of moderate cost, say $5,000, by C. A. Dunham, architect, Burlington, Iowa. It has 308 seats, built of wood, ceilings of pine, finished roof timbers, stained glass windows.

An English Laundry.

The following account of a large English laundry is condensed from the columns of an English paper. English laundries present several distinguishing features when compared with those of this country. In England, it is rather the rule than the exception that laundries should be owned by joint stock companies, while here the proprietors are usually individuals or firms. Over there, it is considered almost indispensable to have a lady in charge of the operations, and the British manageress occupies the place held here by the manager or foreman. Another difference is that manual labor is employed to a greater extent than in the American laundries, where machinery does nearly all the work.

The laundry to be described is that of the London and Provincial Steam Laundry Co., with works at Battersea Park road, in the suburbs of London. These are said to be the largest laundry works yet opened in England, and cover a space of upward of an acre and a half, and afford employment to some twenty-five cent improvements. The vans, which at rare intervals bring infected linen to the Battersea works, are lined throughout with zinc. The articles are collected, not in baskets, but in open wirework crates, which are delivered direct into the proper house, and forthwith bodily inserted, without unpacking, into the disinfecting chamber, where they are subjected to dry heat, the only thoroughly effective process yet discovered. Even when thus dealt with they are not free from quarantine, the whole process of washing, etc., being carried on in the same isolated house. The severest penalties are demanded and enforced, not only against any person sending infected articles without giving notice, but against any person employed on the premises who shall fail to acquaint the managers of any case of infection with which he or she may be brought into contact. An unpleasant, but important, subject may be dismissed with the assurance that the management of this department is simply perfect.

The receiving room is about thirty feet square, into which the sturdy square baskets in which the linen is collected are brought unopened. Each of these baskets is devoted to the use of a separate customer, who keeps one of the duplicate keys of the rather elaborate padlock by which it is secured, the other being retained on the premises. The baskets having been opened and contents checked and marked, they pass into a second compartment containing seven cells, each occupied by a young woman, who sorts out the different pieces for the wash room.

The general wash house is a lofty apartment, with an area of about fifty by thirty feet, having down the center a double row of washing machines of various sizes. Along the north wall is a range of large sized pigeon holes or racks, each capable of containing, when duly folded, just so many articles as can be cleverly introduced at one time into the open mouth of the washing machine, thus seriously economizing the time occupied in charging them. Along the opposite wall is a range of washing and boiling troughs for such articles as may require such methods of handling, with an ingenious tramway arrangement by which the manipulation of the hot and dripping articles under discipline is much facilitated. At one end are tanks of boiling soap solution, cunningly compounded after a recipe which, without the use of chemicals, produces in some half dozen turns of the ponderous machine a lather of remarkable thickness and fineness. At the opposite end are "hydros," in which, when washed and rinsed, the various articles are whirled round and round at the rate of four hundred revolutions per minute.

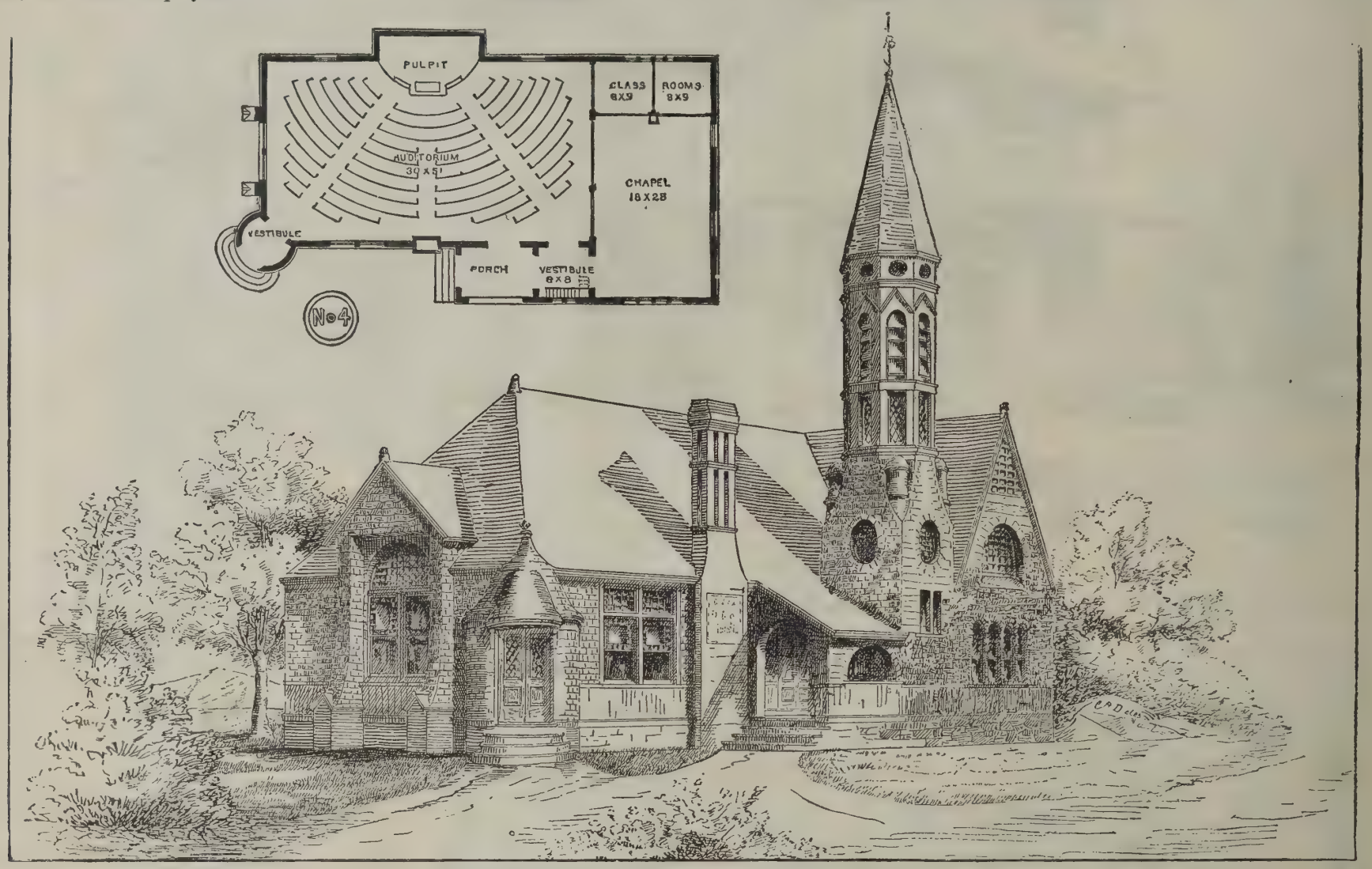
The mangling or calendering department contains, besides the usual machines, a calender said to be the largest ever constructed, carrying a "glosser" capable of manipulating the largest sized table cloth unfolded. In the ironing rooms scores of young women are employed, and we are informed considerable difficulty is experienced in obtaining an adequate supply of help for this kind of work, though good wages are paid. For curtains, lace, and the like, there is a separate room, in which these fragile and unwieldy articles are neither ironed nor mangled nor calendered, but carefully strained on frames over a vast range of steam pipes.

An important part of all washing operations is the drying, which is here done in a fine open yard of nearly an acre in extent, provided with wide stretches of lawn for bleaching purposes. When the weather is unpropitious, the necessary operation is carried on with equal expedition in a spacious drying room, opening into the mangling and calendering room, and fitted with a magnificent range of drying frames, each twelve feet in length by seven feet high. The drying ground is fitted with an arrangement of ornamental iron posts and strong galvanized wires, specially designed to preserve the articles intrusted to them from the damage frequently inflicted under the old system of cords and clothes pegs.

The boiler house, engine room, stables, and sheds for vans do not call for particular mention.

One of the most important features of the entire establishment is the well, over four hundred feet in depth, sunk in the yard at a cost of something over £600, and extending into the chalk, from which it extracts a supply of water running to eighteen or twenty thousand gallons per diem, and described as admirably soft. The laundry uses in a year fifteen tons of soap and about forty-two tons of starch. The net profit realized by the company last year was $12,000, which allowed the payment of a dividend of six per cent.

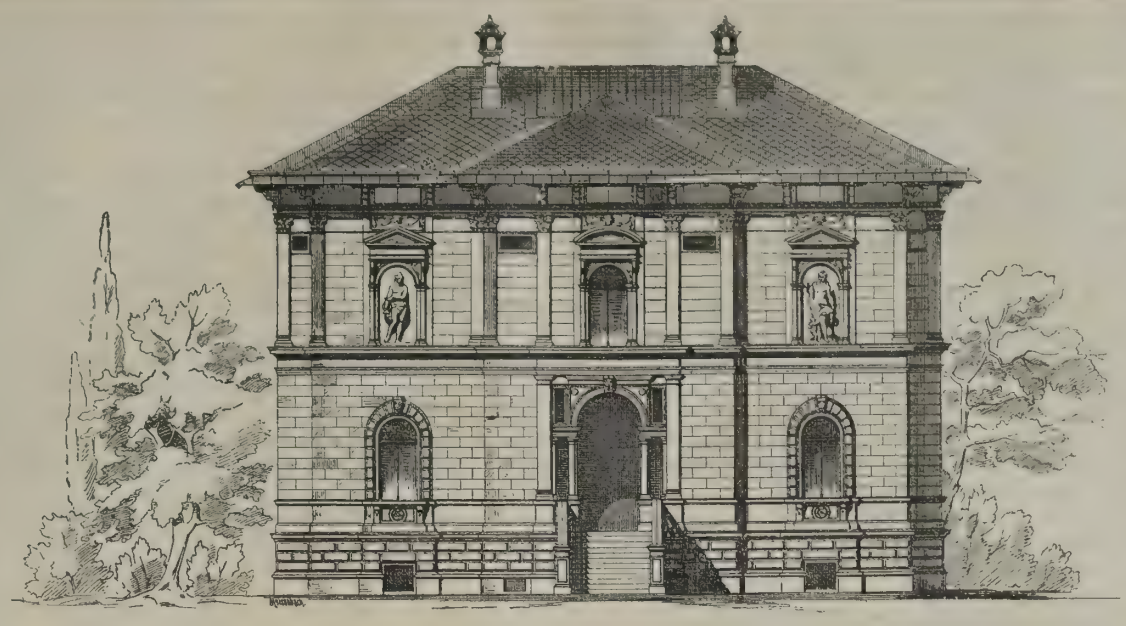
Some of the figures given are rather surprising, such as the extractor making only four hundred revolutions per minute. In this country a much higher speed is given, and cases are recorded of extractors being run at 1,800 and even 2,000 revolutions per minute. This is dangerous and altogether unnecessary, for as we have pointed out in a former issue, the limit of effective power is reached at 1,500 revolutions in a minute. Nothing is gained by a higher rate of speed, and the risk of bursting is vastly multiplied thereby.—*Nat. Laundry Journal.*

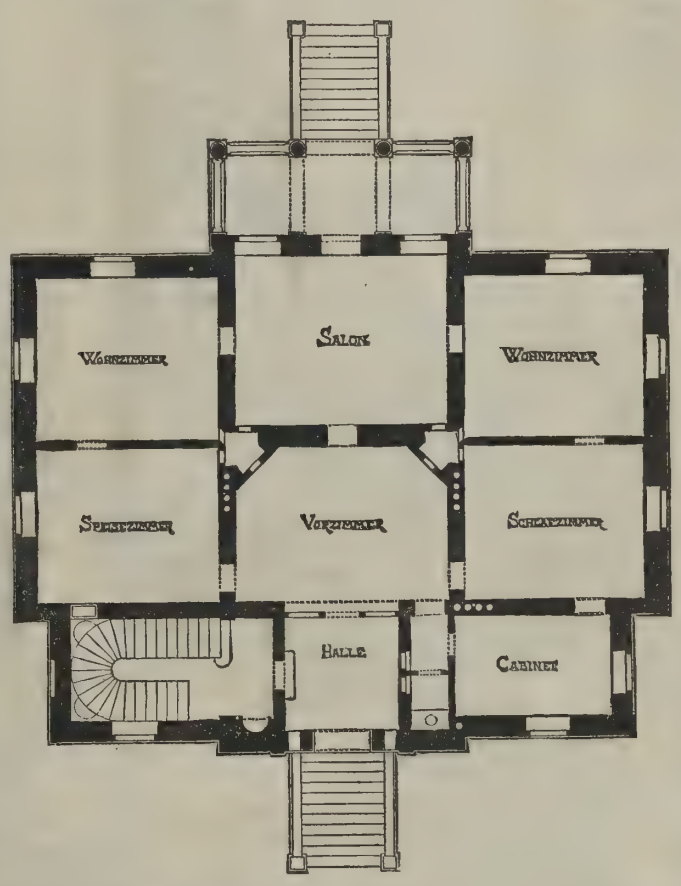


DESIGN FOR A CHURCH OF MODERATE COST.

AN AUSTRIAN VILLA.

We give two elevations and a floor plan of an Austrian country house, at Bozen, by L. Theyer, architect, of that place. From *Architektonische Rundschau.*





Mud Architecture in Persia.

Whether the Persian architecture was contemporaneous or derived from the Assyrian, Egyptian, or Indian, is a question into the investigation of which I am at present not prepared to enter; but certain it is, judging from the voluminous writings of competent men, that the Assyrian and the Egyptian were the most ancient styles which formed the groundwork of all others that adorn the various parts of the globe. Until recently it was supposed that the Persian architecture owed its origin to the Indian, but the study of the archæological remains of the various Eastern countries has enabled the specialists engaged in the work to fix the date of the former structures far anterior to that of the latter or Indian. The birth of the Roman and Grecian styles, their semblance and peculiarities, are no longer invested with doubts or involved in mystery, which had so long exercised the minds of the enthusiastic students and travelers of the old and the new worlds. The arch semicircular, Gothic with their many variations—the pillar, the capital, the dado, the architrave, and the various details of ornamental construction—are no longer ascribed to accidental observations or similitude, but have descended to us from remote antiquity as the triumphs—though rude—of the Assyrian and Egyptian structural art. The evolutionary process which the art has, during its progressive descent to us, passed through has given to the world architectural beauties unapproached in the annals of ancient architecture.

If architecture is correctly defined as being nothing more or less than the art of ornamental construction, then I am bound to say that of all Oriental nations the Persians appear the most advanced in the art wherein mud or earth plays a most important part. Any one journeying through or sojourning for a short period in Persia cannot avoid being struck with the high excellence which mud, common mud, can be made to attain in its employment in architectural works. Forts and fortresses, courts and country houses, palaces and public offices, colleges and convents, mosques and minarets, towers and temples, caravansaries and crown buildings, bazars and breakwaters, are all made of mud—despicable mud, whose qualities in the constructive art are only appreciated and acknowledged when moulded into bricks and burnt in a kiln. This is not all, for even culverts or bridges of small span are also made of mud, a single arch of 10 to 12 ft. spanning the water's course from bank to bank at springings whose line is far above the highest water level. Nearly all the buildings in Persia are built of mud and sun-dried bricks ornamented with gatch or gypsum, and a short account of building and construction after the Persian fashion will not be out of place in your journal.

The principal materials which enter into the composition of a mud building are straw, quicklime, gypsum or gatch, and stone pebbles. Any one desirous of having a residential house in or out of town has only to give notice of his intention to the mehmarbashi or the principal architect of the city or town—generally a Persian—who either repairs to the party himself or deputes his assistant or bannabashi to ascertain the size, style, and description of the building required. This obtained, the mehmarbashi or architect prepares a plan which he personally takes to the saheb; and, after explaining to him the general outside features and internal arrangement, and the cost probable, he leaves it to him to decide when, where, and how the house should be built. No building is started unless the day is auspicious—rozikhair—and when that day is determined upon, as also the size, style, etc., fixed by the future owner of the building, the mehmarbashi is sent for, and the hukum or order given.

Thereupon the builder commences operations. Brick making being the first thing, he sends his falehs or assistants to proceed with that work. The bricks are made of clay previously prepared. This is done by first digging the ground and allowing the clay to remain exposed for two or three days in the sun. It is then saturated with water and exposed for two days longer, when it is subjected to the operation of treading or tempering. The clay is then moulded into bricks $9'' \times 9'' \times 2''$, and the surface is luted over with water mixed with chopped straw or kah, of which seven seers are used for every 1,000 bricks moulded. This superficial plastering of straw is intended to prevent the newly made bricks from cracking. A single moulder can manufacture from 2,000 to 2,500 bricks per diem of six hours. The cost varies from 8 annas to 12 annas per 1,000, and sometimes more when they are intended for the kiln. When the bricks (sun-dried) are ready, the mehmarbashi marks the foundations according to the rung or plan, and the pits or trenches are then dug, and the whole exposed for several days, generally one week, until the trenches and debris from the same are quite dry. The clay thus dug is of very tenacious character, and is called roost, a kind of fire clay. The foundation is laid in with this clay, mixed with quicklime. It is well treaded and rammed, and then allowed to stand over for a week. The thickness of walls is determined by the weight and height of the superstructure, and is invariably spoken of as so many fingers breadth. The walls are built with unburnt bricks and clay, and the arches with the same bricks and gatch or gypsum. A bannabashi or a mason seldom uses the rule or plumb line when building a wall, his guide to straightness and verticality being the eye and the trowel.

The small arches, of which there are many varieties, are never built with centerings, as in this country. It is sufficient when the first ring is made; all others follow it endways until the whole arch is completed in. It is made of a single brick on edge, and kept in position in course of construction by means of the gatch and wedges of pebbles. The gatch dries as soon as applied on the edge of the bricks, which are pressed or placed in position before it dries or dies. The pebbles are used as wedges only in the extradol joints of arches, where the joint is wider than in the soffits. The circularity of the arch is determined by means of a line or string from the center of a bar placed along the springing of the arch, or, rather, span, or parallel to it, the said string being equal to the radius of the circle of which the arch is a part.

Where arches exceed 10 ft. in span and 30 or 40 ft. in length, arched ribs are put in over centerings, placed 10 ft. apart, and the arch work of the spaces is filled in, as before, with bricks on edge, single, but without the help of centerings. Except in tarbi, or extra strong arches, where the bricks are used on their planes or flat, *i. e.*, endwise, all other kinds of arches, such as the gabri or Parsi, which is never or seldom built without shaloob or centering, the almaztrash or diamond-shaped, and the ghace or pointed—Gothic—are invariably built of single brick on edge.

When the arches or domes are completed, the spandrels, or sandooghas, are filled up with broken bricks, carefully arranged. Over this is laid fine, loose earth, which is rammed down to the required level preparatory to receiving the khahgil plaster, which is prepared in the following manner: The clay, to which is added chopped straw, is first made and well tempered by the feet. It is then allowed to stand for several days, with water just covering the top of the clay, which is mixed in small tanks. When thus prepared, it is laid over the loose earth which had been rammed level previously, and thus the roof is completed.

The thickness of the khahgil plaster for the roof ranges between 3" and 4". After the roof is completed the parapet walls facing the streets and the neighboring buildings are raised 5 and 6 ft above the level of the roof, tapered, and similarly plastered with khahgil. The facade of the building is either plastered over with khahgil of finer quality colored with red or yellow ocher and lined and paneled out in gatch or gypsum or entirely plastered with the latter and ornamented with mouldings of the same material. The interior of the building—the rooms—are generally plastered with khahgil of the finest quality, called sungil, which is composed of fine clay, the husk of wheat, horse or cow dung, and the coloring matter. These are mixed in large vats and allowed to stand for several days—seven or eight days—when the clay is considered ready for use. It is then applied to the wall with a trowel, care being taken that it is uniformly laid. The projecting angles of walls and recesses are picked out in gatch and colored to suit the

AN AUSTRIAN COUNTRY HOUSE.

khah or rather sungil plaster. A single mason will lay in 2,000 bricks for a day's work. When the wall rises beyond the reach of assistants or bearers of bricks and clay, the bricks are not taken up in hod or basket, but are thrown up from hand to hand to men placed on scaffoldings or stages until they reach the bricklayer. Leather gloves are worn by the throwers to save their hands from injury arising from the constant friction between the bricks and the palm of the hand.

Gatch is only used in building of arches or mouldings, and is never mixed up in larger quantities than a few seers at a time when employing it as a cementing material or for mouldings. When in course of preparation for these works, it is kept in constant motion to prevent it from dying or getting flat, and therefore useless. The gatch is much appreciated for its quick setting and adhesive properties. It is the only and best cement used in arched masonry and mouldings.

The inclosure walls of the house are sometimes carried to great heights—30 to 40 ft.—as a protection against thieves. They are built solid about two-thirds of the height, the remaining portion being built in sandooghas or chambers which run along the length of the wall—generally of enormous thickness at the base and gradually tapering to a point or edge.

This is the modus operandi of building an ordinary dwelling house; and though the same method is observed in the construction of more pretentious buildings, public or private, the difference is only in the choice of materials. There are huge buildings three and four stories high, built of sun-dried bricks faced with burnt bricks and the joints filled in with lime or fire clay and glazed green or blue. Vaulted bazars are entirely built of sun-dried bricks, decorated with figures and flowers in gypsum. The perfection to which clay has been carried in the constructive art is evidenced in the former and the present capital of Persia, by the magnificent caravansary known under the name of Caravanserai Mukhlis; the buildings in Charbagh or four gardens; the public buildings in Maidanishah; and last, but not the least, the Halfdast or the royal palaces, old and new.—*Zulpah, Indian Engineering.*

TOMB OF COLONEL HERBINGER, MONT PARNASSE CEMETERY, PARIS.

This monument to the unhappy Colonel Herbinger was erected last December, by his mother. The base, measuring 3 ft. 8 in. × 7 ft. 4 in., is placed above the family tomb. Above it rises a statue of Joan of Arc, from whose family Col. H. descended, and a column surmounted by a bronze bust of Colonel Herbinger. Below the statue, upon a cushion, lies the wreath of victory, and upon that is thrown a broken sword. M. Etex, sculptor.—*La Semaine des Constructeurs.*

TOMB OF COLONEL HERBINGER, MONT PARNASSE CEMETERY, PARIS.

Window Glass.

The base of all glass is silica. The most convenient form in which it is found is in fine sand. Upon the due proportion of this substance in glass depends its compactness of body, brilliance, and capacity to withstand sudden changes. It often happens, either on account of want of sufficient heat in the furnace, or in order to save time in the melting or founding, that too small a proportion of silica is employed. Glass which has this fault may be known by its rapidly attracting moisture. Plate glass is composed of sand, carbonate of soda and chalk, with small quantities of arsenic and manganese. The proportions vary at different works, but the general proportion is: Lynn sand, 400; carbonate of soda, 250; ground chalk, 35—by weight.

The quality of the glass depends upon the quality of the alkali. Plate glass is melted in large open pots. The furnaces are square, containing sometimes four, sometimes six pots each. When the glass is melted, which takes twenty-two hours, it is removed to another furnace, where the pots are smaller, of a cylindrical form. Here it is fined, which occupies four to six hours, and when free from air bubbles and impurity, the pot with the glass is removed bodily from the furnace by means of a crane, and hoisted to the end of the casting table, upon which the glass is emptied. A large iron roller which works inside the flanges of the casting table is then made to pass over the melted glass in order to flatten it out. It is then removed upon a wooden table on wheels to the annealing arch, which is now at a high temperature, and here it is excluded from the atmosphere until cold. The glass is rough and uneven, but it is afterward cut flat by machinery, and then smoothed and polished.

It is these processes which render plate glass so costly. Crown or window glass is of much the same composition as plate glass, except that a cheaper description of alkali is used. The ordinary mixture is: 500 cwt. of Lynn sand, 2 cwt. of ground chalk, and 1 cwt. each of sulphate and carbonate of soda. The square furnace and the open pots are used, there being generally six pots on each furnace. It takes from fourteen to twenty hours to melt this glass, and it then requires to stand four to eight hours to allow it to become free from all air bubbles and to cool sufficiently for working.

Window glass is formed by blowing. Upon the blowing iron is gathered at three several times (the fluidity of the glass never allowing fewer) the weight of glass necessary to produce the table, and which weighs 11 lb. This is then blown out, leaving a solid lump at the farthest extremity from the blowing iron for attaching the punty. This is called the bullion. The punty being fixed to the bullion, the blowing iron is relieved by merely touching the glass with a wet iron. Being firmly attached to the punty, it is removed to a small cylindrical furnace, called a flashing furnace, where a rotary motion being given to it, increasing as the glass becomes softened by the heat, the centrifugal force, together with a little sleight of hand on the part of the workman, produces a flat circular plate or table, as it is then called.

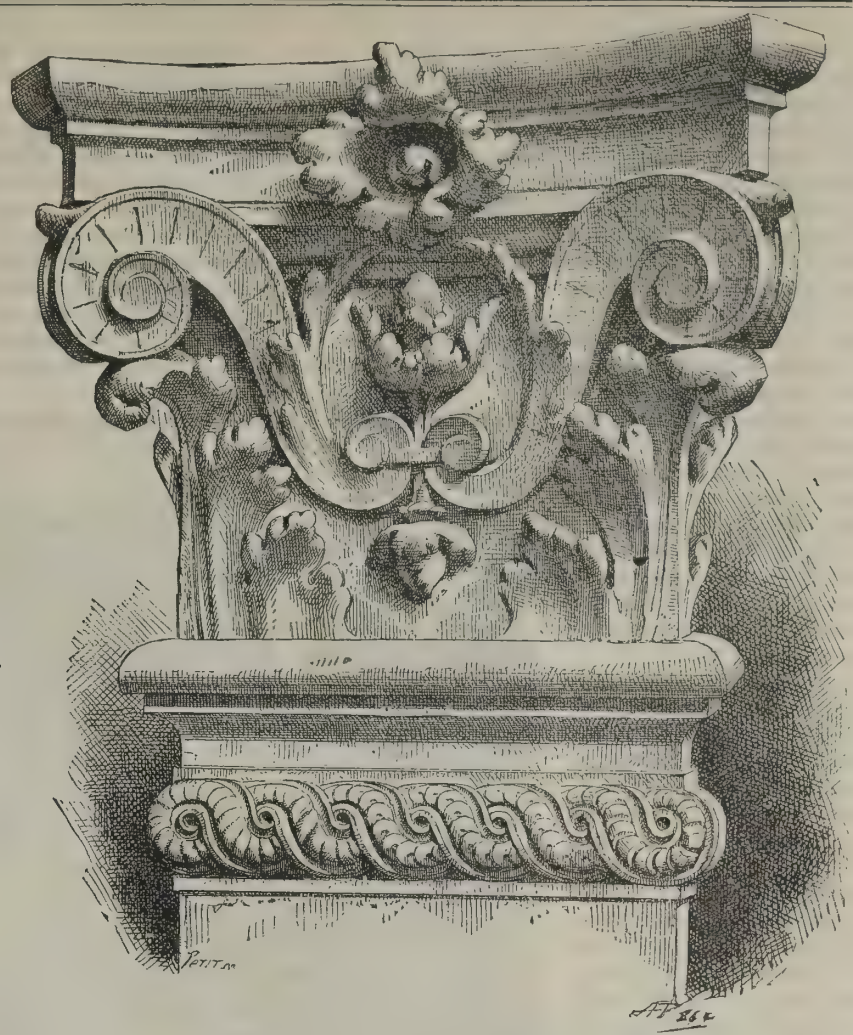
British plate or German sheet glass is of the same composition as plate glass, but the manipulation is different. The glass is blown into open cylinders, and when cold these are cut open along the length with a diamond and placed in a flatting furnace, which is at a sufficient heat to bring the glass into a semi-fluid state, so that it falls quite flat. The sheets thus made are afterward cut flat and polished. The size of the sheet is restricted to what can be blown and worked by one man. It is cheaper than plate glass, because all waste is avoided and less cutting is required.—*A. Pellatt.*

Basswood.

Basswood is commonly ranked among woods as a scalawag. It is not so much of a scalawag, however, as some people think it is. For certain uses it is admirable. For organ keys, trunks, several kinds of small boxes, carriage bodies, woodenware, paper pulp, and for many articles which are turned, it is just the thing. In some sections of the country, as a matter of economy, it figures as a building wood, but when used on the outside of a structure, the builder in due time discovers that it is false economy. A Wisconsin manufacturer is making basswood doors which he sells as a No. 3, and calls them linn, another name for basswood. Basswood is also known as linden, and in some sections it is called the bee tree, from the fact, undoubtedly, that its flower is a favorite with the honey bee. There is a curious story current in Wisconsin sash, door, and blind circles that is worth repeating. A manufacturing concern shipped a Western customer a car or so of doors with basswood panels. It was probably an experiment to the extent that the doors were sent out as a feeler to ascertain if the average retail dealer in the "rowdy West" could tell a basswood from a pine panel. In this case he knew it wasn't pine, for on receipt of the doors he wrote the Wisconsin men, asking them what they took him for. They didn't tell him what they took him for, but, presumably before the letter was received, a representative of the house started for the Western customer, and before the customer had time to make any complaint the representative informed him that his house had made a mistake. It had made to order for an Eastern man a lot of doors with applewood panels. By mistake these doors were shipped to this Western customer; the doors were expensive; the representative trusted that the customer would at once see the point, and, so far as he could, correct the mistake of the house. The customer saw the "point," and promised to pay an extra price for the doors, and is probably dealing them out to builders as an extra choice article. If the story is founded on fact, it is a decidedly rich one.

The worthlessness of basswood for some purposes and its value for others shows simply that it was intended that man should go around with his eyes open. If he puts basswood in a weight-bearing position, or makes a handspike of it, he will get left. But it is a necessary cog in the wheel, and if rightly used in the right place, the machinery runs along without a hitch.

INTELLIGENT FORCE—CARYATID ORNAMENTING AN INTERIOR DOOR IN THE HALL OF ST. JOHN, NEW CITY HALL, PARIS.



CAPITAL OF A PILASTER IN THE NEW CITY HALL, PARIS, IN THE STYLE OF THE TIME OF FRANCOIS I.

BRACKET SUPPORTING THE CLOCK, CITY HALL, PARIS.

MONOGRAM (REPUBLIQUE FRANCAISE) FOR THE NEW CITY HALL, PARIS—CARVED IN STONE.

PLENTY—CARYATID ORNAMENTING AN INTERIOR DOOR IN THE HALL OF ST. JOHN, NEW CITY HALL, PARIS.

SELECTIONS OF CARVED WORK FROM THE NEW HOTEL DE VILLE, PARIS.

Painted Plate Glass Mirrors.

This style of painting, which has lately become so fashionable, appears to be of Roman or Venetian origin, and in many old palaces on the Continent traces of it, dimmed by the lapse of ages, may be met with. At the present time the art has been to a considerable extent revived in Rome, and the artist Fornari's work is esteemed to be superior to that of the old specimens. His designs are in the old Cinque Cento style, and are remarkable for the richness and variety of the flowers and arabesques introduced. The work is not difficult, and can be satisfactorily accomplished by any amateur who has a good knowledge of flower and bird painting. It is done upon deeply beveled looking-glass, which is then framed in wide, ebonized frames, or in a china mount, or in Salirati's celebrated raised and colored glass frames. When framed in ebonized wood, the painting is so designed as to droop over the glass from one side, and to be carried on over the side of the frame.

By this means the reflection of the painting is clearly seen, and yet the glass is useful for other purposes. Brackets and long mirrors for boudoirs are mostly ornamented in this way, while plate glass stove screens and other large articles have their ornaments springing from the bottom, from which the design rises and spreads evenly over a great part of the mirror. Such subjects as apple blossoms, cherry blossoms, and hawthorn are the most suitable for brackets, while tomtits, goldfinches, butterflies, and bees are introduced either upon the branches or hovering about the flowers. For fire screens, water lilies and their leaves, flags, mixed with the flowering rush, meadow sweet, and purple loose strife are good, with kingfishers, moor hens, and dragon flies as their accompaniments.

Draw out the design in outline upon cartridge paper, then take some lithographic ink and a lithographic pen, and with these trace the outline upon the glass, keeping to the prepared design as a guide. When the outline is dry, fill in the design with a coat of flake white oil paint, which mix with a little *siccatif de Courtray* as a drier. Use a red sable hair brush, and work the oil paint on it quite smoothly. Then proceed as in ordinary oil painting.

Flour Adulterations.

Of the many substances with which flour is adulterated, those in most frequent use are plaster of Paris, the dust of burnt bones, pea or bean meal, and potato flour. An easy general mode (writes an expert) of testing the purity of flour is to squeeze it in the hand. The cohesiveness of wheat flour is very great, and consequently the lump so squeezed in the hand will be a longer time before it breaks and falls if of wheaten flour than if the flour be adulterated. Plaster of Paris, the dust of burnt bones, and pototo flour are also much heavier than wheaten flour, so that adulteration by them may be easily detected. A sack which will contain two hundredweight of wheat flour will hold three of potato flour, so that, should the flour be adulterated with any amount of potato flour, it may be detected by means of its weight.

Should pea or bean meal be mixed with the flour, it may be detected, if in any considerable quantity, by pouring boiling water upon a cupful of the flour, or by toasting a piece of bread made of it, the odor of the pea or bean being sure to rise while the meal or bread is hot.

Adulteration by means of the flour of inferior grains is more difficult of detection, but may be ascertained by pouring upon a spoonful of flour a little pure spirits of hartshorn. If the flour be wholly of wheat, the hartshorn will render it of a yellow color; but if it be adulterated with corn, the hartshorn will turn it to a pale brown, and if it be adulterated with pea or bean flour, it will become a darker brown.

Adulteration by means of potato flour may be detected by means of acids. Take a spoonful and pour upon it a little nitric acid; if the flour be of wheat, it will be changed to an orange yellow; if wholly of potato flour, the color would not be altered, but the flour formed into a tenacious jelly; if, therefore, the flour be adulterated with potato flour, it will not be difficult to decide. Again, take a spoonful of the flour, and pour upon it a little muriatic acid; if the flour be of pure wheat, it will be changed to a deep violet color, without odor; but if potato flour be mixed in it, it will then have an odor like that of rushes.—*Roller Mill.*

The Chinese Wall.

An American engineer, who has made the subject a special study on the spot, has calculated that the Chinese wall has a contents of eighteen million cubic meters (6,350 million cubic ft.) The cubic contents of the Great Pyramid is only 241,200 meters. The material used in the construction of the Chinese wall would be sufficient to build a wall round the globe 1·8 meters (6 ft.) high and 0·6 meter (2 ft.) thick. The same authority estimates the cost of the Chinese wall to be equal to the railway mileage of the United States (128,000 miles). The stupendous work was constructed in the comparatively short period of twenty years.

Engine Room at Ferguslie Mills, Paisley.

Our illustrations show views of the new engine room connected with the magnificent mills just completed at Ferguslie, near Paisley, for Messrs. J. & P. Coats, the well known thread manufacturers.

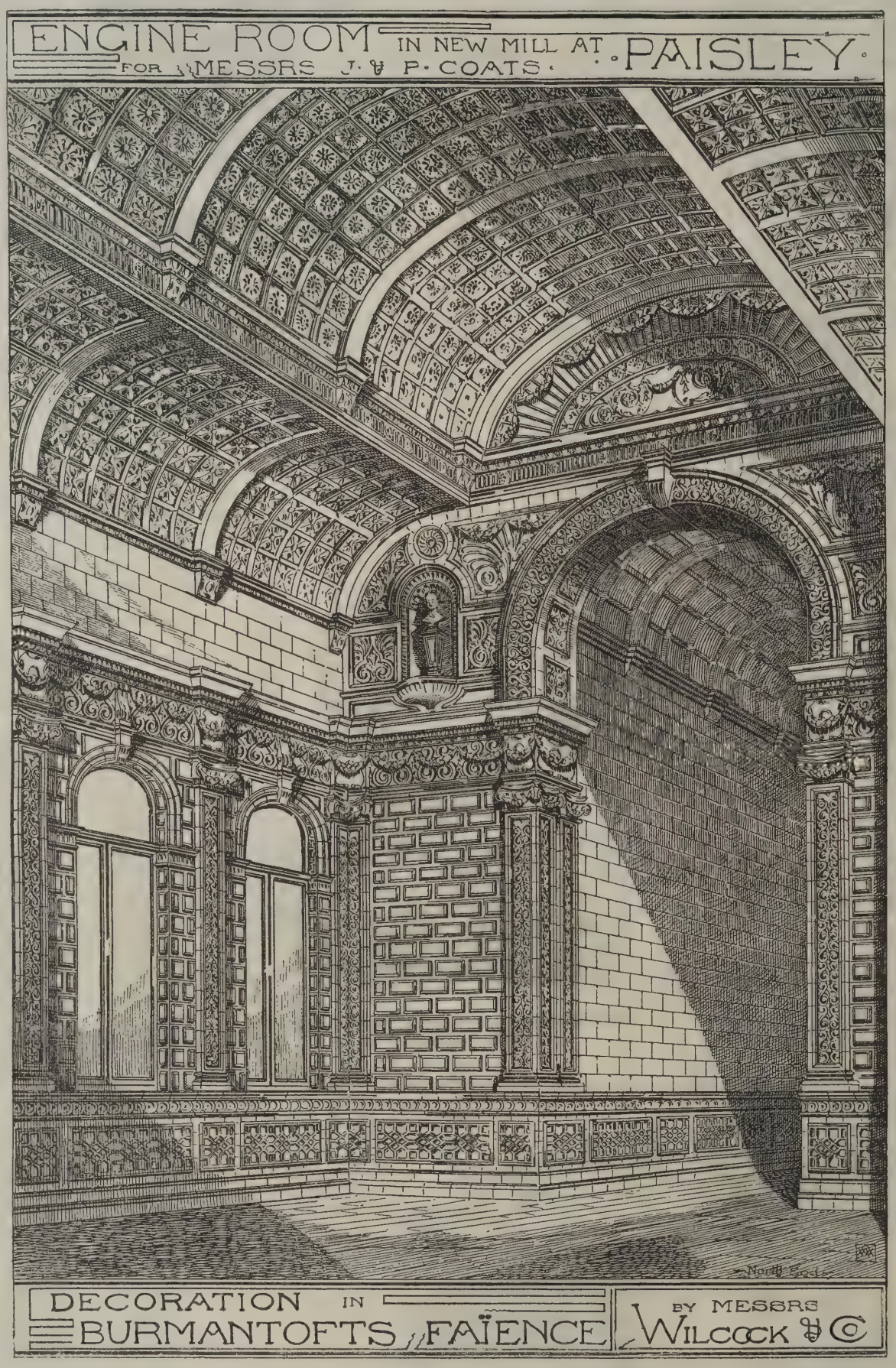
The erections which have just been completed are to supplement works which have been carried on successfully upward of a century, and mark a distinct development, not only in the production of thread and sewing cotton, but in the erection of premises and machines to produce the same.

The mills just completed are probably the finest mills existing in the world, and Messrs. Coats have spared neither thought nor expense in carrying through the whole of the work in the most perfect and complete way possible. The new mill is 400 feet long by 130 feet wide, contains five floors, and is about 100 feet in height. An ornamental parapet is carried round the whole of the building, and is embellished with turrets at the angles, which are used for ventilating purposes, also by towers over the staircases. Below the base the structure is of stone, and above this point it is constructed of pressed brick.

The mill is lined throughout with glazed bricks, a dado of brown running through each room to a height of about five feet. The floors are in the best form of fire proof construction, being formed of wrought iron girders, and laid in cement concrete. Over this are laid ordinary floor boards, and over these again floors of half inch maple boards. The iron beams are all cased up with perforated zinc, and plastered. The columns are all incased with wire, and plastered. They have also ornamental moulded capitals, and the whole of the ceilings and ironwork are painted with enamel paint. The cleanliness, lightness, and general air of brightness and cheerfulness thus obtained is noteworthy, and forms a distinguishing feature of the salient points Messrs. Coats have had in view in their method of construction. Although the rooms are so wide, yet they are admirably lighted with natural light throughout, and in the absence of natural light, an ample provision of electric light is made.

Our illustrations refer to the engine house only, and it will at once be obvious that this is no ordinary structure. It is detached from the main building. The interior dimensions are 80 feet long, 40 feet wide, and about 80 feet high. The engines themselves are what are denominated compound tandem engines, of 1,500 horse power, the fly wheel being 35 feet in diameter, and having forty grooves for ropes, these ropes working on to pulleys in the main body of the mill, through the rope race.

The whole of the interior of the engine house is lined with Burmantofts faience, treated semi-constructionally, both the method of construction and the design being unique and specially adapted to give solidity and breadth of effect. The floor is laid in ceramic mosaic, the windows are of decorated glass, the window frames and all the woodwork being walnut and teak. The color scheme adopted throughout has been directed to secure thorough harmony of result. The dado is carried out mainly in browns and sage greens. The enriched band of the dado is treated in sage green and rich yellow brown, with the mouldings of deeper brown. The wall surface is a deep rich brown ivory in tone, and the effect of the rustication is considerably enhanced by the beautiful deeper tones of the color



developed by it. The mouldings of the pilasters are in rich teapot brown, the panels being picked out with yellow greens, yellows, and browns. The caps are picked out to harmonize with the pilasters, and the frieze, which is in strong relief, running all round the engine room, is freely treated in harmonious tints of yellow greens, brown, and yellow. The ashlar above the frieze is treated in pale yellow, with brown mouldings above and below. The corbels are also treated in brown. The general effect of the ceiling is a combination of brown mouldings and light tones of yellow in the panels. The mouldings of the ceiling are all in walnut, and the upper frieze band is in a quiet tone of faience. We are not aware that so elaborate an engine house has been erected in connection with any undertaking either in this or any other country, and, in adopting the use of Burmantofts faience, Messrs. Coats were actuated by the intention of having primarily a material essentially suitable in its cleanliness and durability, and, secondarily, of securing as complete an artistic result as could be secured, and so make their engine house not only a show place in the best sense, but one worthy of containing the magnificent engines which form the motive power for their new works.

The architects of the new mill and engine house are Messrs. Morley & Woodhouse, of Bradford and Bolton, and the Burmantofts faience has been supplied and fixed in their best style by Messrs. Wilcock & Co., of Burmantofts, Leeds, and may be taken as a favorable illustration of the successful application of their now well known specialty to a purpose outside the ordinary run of decoration, but a purpose for which it has proved itself to be most admirably adapted.—*The Architect.*

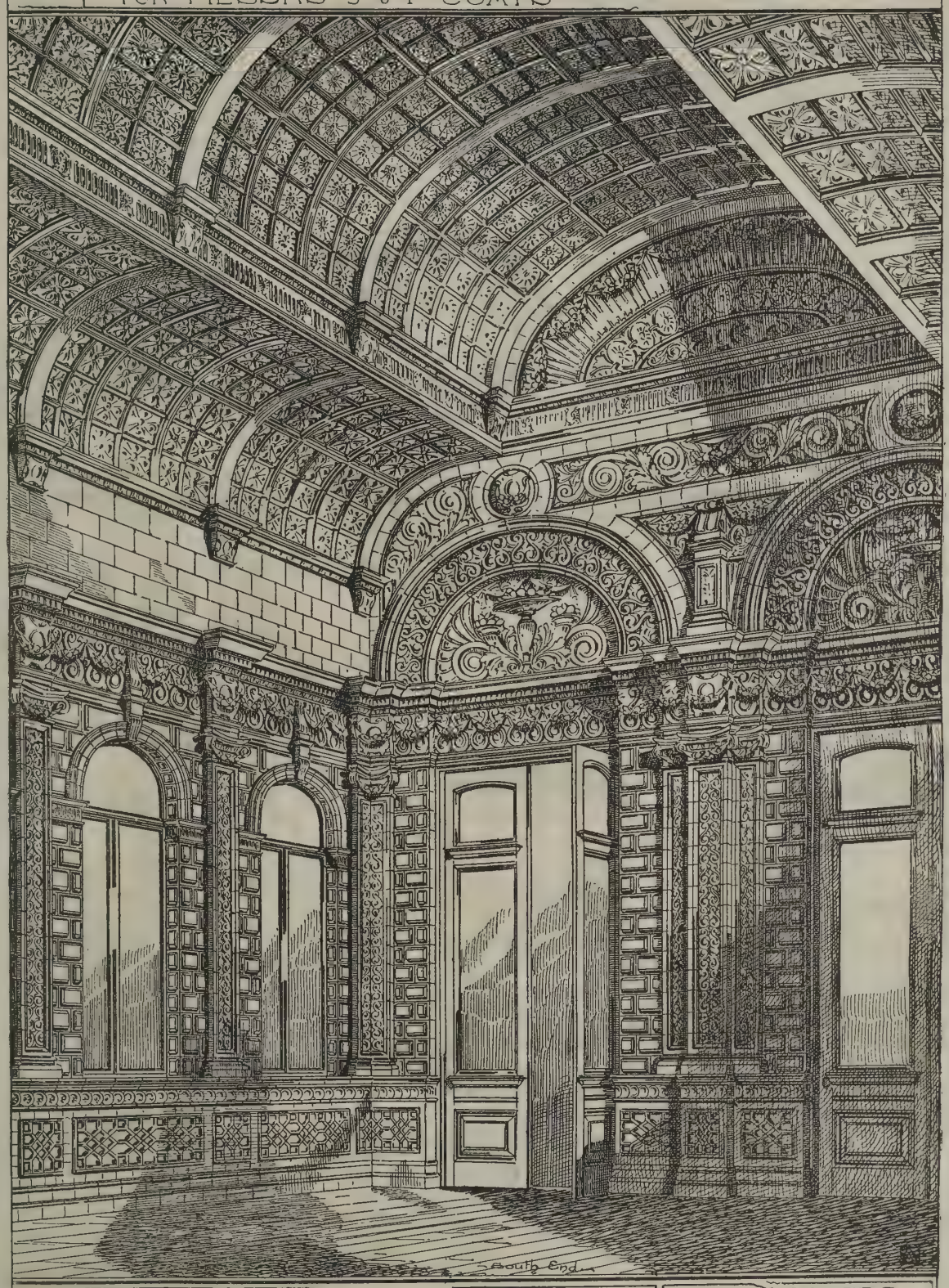
About Kerosene Oil.

Why does oil stink in use in the lamps? With the best oil that is made you can produce a gas in your house that will make the atmosphere as disagreeable as it is unhealthy. In all lamps where proper and complete combustion is maintained, there is no perceptible odor from any quality of oil sold in the market. But the trouble is, when people want to leave a house or a room for a time and keep a light burning, they turn down the wick. This is done for economy in most instances, but there is not only no economy in it, as I shall show you, but there is also a danger to health and life. Now, when you light a lamp, there is at first a time when the flame will not burn high without smoking; but after the lamp and chimney are properly heated, and a full supply of oil is established through the capillaries of the wick, a strong flame can be maintained. Now, if, with this supply established, we turn down the wick, owing to its decrease of burning surface, the supply of oil continues in the same ratio, what is not consumed in the flame being volatilized into gas, which is carried out with the ordinary products of combustion into the air of the room, vitiating it and making it very unhealthy to breathe. Now, here, in my opinion, is the basis of lamp explosions, and if the proper proportion of atmospheric air gets into a chimney, or is blown into it, an explosion is sure to result. In my opinion, most of the explosions of lamps, so called, occur by explosions in the chimneys. A lamp should never be turned down. It can be easily extinguished by blowing across the top of the chimney, and a very little practice will show that this is the easiest and best way. After blowing out, the wick should be turned down inside the tube, to prevent the oil flowing over. A close attention to the methods I have indicated will, I am sure, prevent most, if not all, the accidents from explosion of kerosene oil, and save many lives, as well as many thousands of dollars' worth of property every year.—*Boston Herald.*

A Confectioner's Building.

Mr. Charles F. Gunther, the confectioner, has for the past year been engaged in building a magnificent six story confectionery establishment, practically fireproof, and supplied with all modern improvements. The building is of unique and original design, and is located at No. 212 State Street, Chicago.

ENGINE ROOM · IN NEW MILL AT PAISLEY · FOR MESSRS J. & P. COATS ·



· DECORATION IN BURMANTOFTS FAÏENCE · BY MESSRS WILCOCK & CO

The interior decorations of this beautiful store have never been surpassed in this country, or, perhaps, in the world. Artistic design, pure taste and harmony in tone are all apparent, and the fact at once impresses itself on the eye and mind of the beholder. From the front or east door of the store the visitor looks down a broad vista to the grand staircase. The vision is unbroken. There is not a line or reflection to mar the beauty of the scene. The ceiling is an arched canopy of purely original design, and the coloring is of soft, warm lemon tints, relieved by glace blue. The motive of the ornament of the ceiling is the *acanthus leaf*, of which the panels and cornices are formed. The clustered lights, which are unique in design, are placed along the sides of the room, so that their rays are thrown directly across the ceiling, giving a most beautiful effect. This ceiling would do honor to the Vatican at Rome, so celebrated for its magnificent work of this kind.

The materials used in decorating are onyx, jasper, agate, and Lisbon marbles, and hand cut glass in all the delicate lemon shades.

The side wall of the room is ornamented with 2,000 feet of plate glass mirrors, so tastefully broken with brass lines and toned down by the soft colors of the surroundings that there is none of the loud or vulgar effect so frequently produced by this class of decoration. The harmony is so perfect that they simply serve to attract the visitor's attention by reflecting the beautiful lights of the ceiling, instead of blinding him with a blaze of garish light.

The grand staircase at the west end of the room and its magnificent stained glass window are also triumphs of artistic taste. The staircase leads to the upper floor of the building, and is not surpassed by anything in Paris, that city of grand staircases and regal magnificence. The steps are of the choicest rose colored marble, broad and low, with gold tinted and enameled panels and railings. On the sides are handsome Italian arches, draped in mottled silk plush, and on the newel posts large, polished brass figures hold tapers that, when lighted, add to the beauty of the scene. The staircase is illuminated by a magnificent stained glass window, containing 500 square feet of hand cut glass, with polished jewels, a most pleasing feature of this thoroughly artistic work. The broad flood of soft light that streams in through this window spreads far into the building, greatly enhancing the general effect. From the first landing of the stairs the visitor obtains a superb view of the store in all its exquisite beauty. This is the point of vantage, and it will unquestionably be sought by all who enter this novel place of business and who have an eye for beautiful effects. The vista is not dazzling in its brilliancy, but it is nevertheless brilliant. The massing of light and shade and the soft coloring stand out prominently and make the view one of surpassing loveliness.

The furnishing of the store is in full keeping with the adornment. The upholstering is of rich silk velvet, and the shelves and cases of the neatest and most convenient kind.—*Conf. and Baker.*

A Waterproofing Process for Stone.

A waterproofing process for application to stones and mortars has been introduced by Messrs. Faure, Kessler & Co., under the name of "fluatation," and is favorably mentioned in the *Genie Civil*. The process consists in the application to stones, either before or after use in building, of various preparations of hydro-fluosilicates.

The operation is said to be very simple, consisting in the application of the solution by means of a brush, sponge, or hand pump. Three coats are put on during as many successive days, and the result is to make the stone and mortar as hard as the finest marble. Several preparations are made for special purposes, but they all harden limestone. One darkens the stone, another bleaches it, another preserves the original color, while others again are made the medium of staining the stone indelibly. "Fluatation" may be applied to old structures as well as to new buildings, and is preservative to a greater degree than any other known process. Reservoirs, baths, and other structures requiring to be water-tight can be made of stone so treated, and no ordinary liquids attack the preservative coating. Any stone, mortar, or cement may be "fluated," provided it is more or less calcareous.

A FRENCH VILLA AT ENGHIEN-LES-BAINS, FRANCE.

Our illustrations are from *La Semaine des Constructeurs*, a weekly architectural French publication of acknowledged ability.

This villa was recently constructed at Enghien-les-Bains, upon the plans and under the direction of M. Friese, and is an example of the originality permitted and suitable for the country where located.

The foundation is of concrete, and the walls are of the same construction, but with stone work exposed, openings faced with brick, sills and lintels of cut stone.

A MODERN FRENCH VILLA—GARDEN FRONT.

The wood finish is of chestnut. Roof covering of tiles.

The cost of construction was:

Grading, mason work, and paving	$6,000
Wood work	1,900
Iron work	1,880
Plumbing and roofing	2,800
Painting and glazing	1,000
Chimneys	400
Furnace	400
Decoration	320
	$14,700

Oil stains may be removed from paper by applying pipe clay powdered and mixed with water to the thickness of cream; leave on for four hours.

Paper Car Wheels.

The following particulars were recently given in *Harper's Magazine:*

The paper car wheel was the invention of Richard N. Allen, a locomotive engineer, afterward master mechanic of the Cleveland & Toledo Railroad, who took for his aim in life the production of a better car wheel than those in use. His first set of paper wheels was made in Brandon, Vt., in 1869, and after much scoffing he was graciously permitted the use of a wood car on the Central Vermont road, under which they were tested for six months. The Pullman Palace Car Company, in 1871, gave the first order for 100 wheels; ten years after, the Allen Paper Car Wheel Company, with great shops at Hudson, N. Y., and Pullman, Ill., produced and sold 13,000 in a single year. One of the set first experimented with under a "sleeper" is shown at Hudson, with a record of 300,000 miles travel. It is the body of the wheel only which is of paper. The material is a calendered rye straw "board," or thick paper, made at the Allen Company's mills, at Morris, Ill. This is sent to the works in circular sheets of 22 to 40 inches diameter. Two men, standing by a pile of these, rapidly brush over each sheet an even coating of flour paste, until a dozen are pasted into a layer. A third man transfers these layers to a hydraulic press, where a pressure of 500 tons or more is applied to a pile of them, the layers being kept distinct by the absence of paste between the outer sheets. After solidifying under this pressure for two hours, the 12-sheet layers are kept for a week in a drying room heated to 120° Fahr. Several of these layers are in turn pasted together, pressed, and dried for a second week, and still again these disks are pasted, pressed, and given a third drying of a whole month. The result is a circular block, containing from 120 to 160 sheets of the original paper, compressed to 5½ or 4½ inches in thickness, and of a solidity, density, and weight suggesting metal rather than fiber. The rough paper blocks are turned accurately in a lathe, when shavings like leather and a cloud of yellow dust fly off, to a diameter slightly greater than the inner circle of the tire. The hole in the center is also made on the lathe, and after the paper has received two coats of paint to prevent moisture working its way within, the cast iron hub is pressed through by the aid of the hydraulic press, and the wrought iron back plate is clamped on. The suasion of enormous hydraulic power now drives the paper center into the tire by help of the bevel.

Hemlock laths are not to be despised. In the West they are hated by the carpenters because their slivers have a sting, and nails do not puncture them easily. But hemlock laths are making their way against prejudice. A White Lake, Mich., concern has this year handled 1,500,000 hemlock laths, shipping them to Indiana points. They are straight grained and clear of knots, and give good satisfaction.

Blistering.

The season is at hand when our semi-tropical weather makes everything fairly smoke. The sun's beams glance down upon us, and sap all life and activity from our bones. So great and intense is the heat, that at times both man and beast are prostrated unto death.

Is it any wonder that so soft a material as varnish should be heated to the point to raise into blisters, when a carriage stands for hours exposed to both direct rays and reflection from the pavement?

And the higher the grade of varnish, the more liable is it to be raised into blisters, for its very elasticity is its weakness under great heat. Work painted during the winter, and that has had plenty of time to harden, is pretty secure from blistering. It is the carriages that were finished late in the spring that need most careful guarding. That heat will raise varnish into blisters is proved by using flame to remove the old paint from any painted surface.

If there is any oil left, it will manifest itself by expanding into a gaseous form, and as it cannot readily escape, it forces the resistant outer skin into sacs.

Blisters are caused by heat of greater or less intensity. Even in the case of blistering caused by poor japan or other material there is a chemical change, a burning which causes the paint to rise up in patches. Our flesh blisters under the action of both natural and artificial heat and through fever. It will be seen, then, that a blister cannot be made unless by confined vapor or gas in an aeriform state, produced by heat. Moisture or the sap in wood will cause blistering when the surface is heated sufficiently to penetrate and cause evaporation. It is foolish to say that it is impossible because water does not boil and form steam below 212° Fahr. Damp boards gives off vapor under an early morning sun, and the same will occur whenever the dampness is small in quantity. Oil does not boil under 400° or 500°, but it does not take a degree of solar heat above 80° or 90° to cause soft varnish to raise into blisters, when long exposed. We remember, when a boy, seeing the paint on steamboats that ran from Cincinnati to New Orleans badly blistered, and the degree of heat that caused it was not much above 100°.

Paints containing little or no oil when laid over thoroughly dry wood seldom blister, for there is nothing for the heat to vaporize.

Some wonder why it is that a panel or panels will blister in a few places instead of over the entire surface exposed. The same is true under the effect of a burning iron surface or flame, which is probably due to the fact that the vapor is drawn from the parts adjoining the blisters and concentrates in them. A blister here and there on a panel shows that the conditions of the under surface were more favorable to evaporation at those places. Painting that is allowed time to harden thoroughly between coats, and that contains excellent material, is well nigh proof against blistering.

Sometimes the roof of a coach will blister in spots, which may be caused by drops of water, which act as lenses to concentrate the heat in those spots.

Grease in spots that have been painted over is another cause of blistering. The parts of a carriage that are never exposed to the direct rays of the sun do not blister, and an under panel standing at an angle is proof against blistering, except when it is exposed to reflected heat from the pavement. Blisters are more unsightly than cracks, because the former rise above the surface, and are more distinctly visible, and are less easy to hide; for when they are removed they leave round patches lower than the level of the varnish, which require to be puttied and retouched with color for hurried work, and to thoroughly remove them, the paint must be burnt off. A few blisters may be corrected by pricking them and pressing the varnish back to the level; that is, when the operation is performed at once, for when the sac hardens it will shell off.

Fig. 1.—GROUND FLOOR.

a. Veranda. *b.* Dining Room. *c.* Parlor. *d.* Billiard Room. *e.* Sitting Room. *f.* Kitchen. *g.* Office or Waiting Room. *h, i.* Halls. *j.* Water Closet.

Fig. 2.—SECOND FLOOR.

a, Chamber. *b.* Dressing Room. *c.* Chamber. *d.* Dressing Room. *e.* Bath Room. *f.* Hall. *g.* Office or Workroom. *h h h.* Chambers. *i.* Hall. *j.* Water Closet.

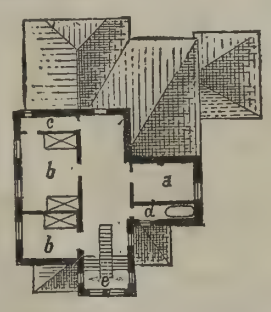


Fig. 3.—THIRD FLOOR.

a. Workroom. *b b.* Chambers. *c.* Closet. *d.* Water Tank. *e.* Stairs to Cupola.

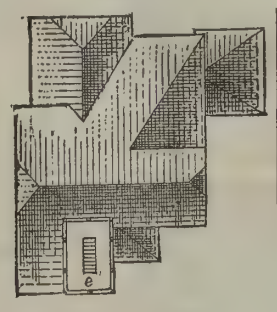


Fig. 4.—ROOF.

When the wood is free from moisture, either inherent or absorbed from the atmosphere just before the priming is applied, and the under painting is bone dry, the liability to blistering is removed to the last coat of varnish.—*Painters' Magazine and Coach Painter.*

A MODERN FRENCH VILLA—PRINCIPAL FRONT.

Artificial Asphalt.

Natural asphalt has generally hitherto been used for paving and other purposes, being either employed alone or mixed with more or less limestone, sand, or other substance, according to its quality and the amount of bitumen in it. An asphalt has also been produced by mixing pure natural bitumen with limestone. The improved process of Dr. Paul Jeserich, of Berlin, dispenses, it is said, with natural asphalt or natural bitumen, and consists in the production of a material having the necessary qualities of the natural asphalt. The artificial asphalt is thus produced: Tar or other semi-liquid or viscid hydrocarbons with a high boiling point are heated in an iron boiler, if possible, with indirect firing, to a temperature of 130 to 200 degrees Centigrade, at which the material is maintained. Meanwhile sulphur is added by degrees in small quantities, according to the nature of the hydrocarbon employed, the sulphur being in proportion of about 5 to 20 per cent. of the hydrocarbon. The less volatile the hydrocarbons are, and the higher their boiling point, the less is the percentage of sulphur required. The sulphur dissolves in the hot liquid hydrocarbon with a powerful reaction and energetic evolution of sulphide of hydrogen and other sulphides.

After the reaction is finished, and the mass has obtained a consistence which is somewhat more fluid than the natural asphalt, it is transferred, while warm, into a mixing apparatus, and thoroughly mixed therein, under continuous agitation, with pulverized limestone, silicate, or the like. About 75 to 94 per cent. of pulverized stony material are required therefor. The product thus obtained is transferred to a kiln, where it is dried at a temperature of about 120 to 150 Centigrade, with frequent movement and turning over of the material, for half an hour to one and a half hours, according to the quantity of material and the proportions of mixture. The mixing apparatus may be so constructed as to be adapted to be heated, and therefore to serve at the same time as a drying apparatus. The powder obtained by drying has the qualities and appearance of natural asphalt, and may be easily worked by stamping, when warm, for producing a solid paving for streets, etc., with a thoroughly hard, stony surface. With this mode of manufacture a hard or elastic or soft material can be obtained at pleasure by more or less heat and greater or less amount of sulphur added within the aforementioned limits. The finished material may also, if required, be mixed with natural asphalt.

Staining and Finishing Common Woods.

A correspondent of the *Wheelwright* desires to know how to stain and finish common woods in imitation of walnut. He does not like that kind of work, but it looks dingy and black and not at all nice. The answer is given as follows: To stain common woods, as pine, whitewood, ash, oak, etc., to imitate black walnut, take burnt dry umber and mix it with stale beer or with water to which a little sugar has been added; rub the wood over with the solution, using a sponge or rag, and then varnish when dry. Another excellent stain to imitate black walnut is made by taking two quarts of rain water, adding three ounces sal-soda, four ounces Vandyke brown, and one half ounce bichromate of potassa, and boiling the mixture for fifteen or twenty minutes. It can be applied with either a brush or sponge. When dry, varnish (hot or cold). Woods that are stained will finish up nicely if the first coat of varnish be a shellac varnish, which, being a spirit varnish, assimilates better with the stain coat and enriches it. It also prevents the copal finishing or rubbing varnishes from striking in.

THE COLLEGE OF THE CITY OF NEW YORK—THE TECHNICAL COURSE.

The tendency of modern educators is every day more directed in the way of manual training. The first steps in children's education by the kindergarten method of Froebel, and the followers and amplifiers of his system, consist in a training of the faculties of observation and manual accomplishment. It is claimed that by this system a child need only commence to learn to read when seven or eight years of age, and that, owing to his kindergarten training, he will pass by one who may have learned reading several years earlier, but who never had a regular course of object lessons. The object system being established as a foundation for educational training, the extension of the same system to the higher courses seems only logical. A strong movement to effect this has become prominent here and in other cities during the past year. In New York the project of establishing such classes in the public schools has been successfully carried out. Considerable notice has been taken of the attempts. The work of the students has been publicly exhibited, and commented on in the papers. While this has been going on in the grammar schools, and before this period, the College of the City of New York has unobtrusively, and without attracting any notice, carried out a similar advance. Manual and technical education is firmly established there. From blacksmithing and carpentry up to chemistry and physics, the leading branches of technical training have a place in the course.

The president of the college, General Alexander H. Webb, saw from an early period the necessity in a college course of making men think for themselves. Thus, to render the lectures in ancient art and history concrete, reference could be made by the professor to the college collection of pictures and models. If the Venus Victrix or Apollo Belvedere was spoken of, a picture or cast of the statue was at hand for illustration. Athens

THE COLLEGE OF THE CITY OF NEW YORK—THE TECHNICAL COURSES.

1. Microscopy. 2. Chemical Laboratory. 3. Blowpiping. 4. Wood Lathe. 5. View of College. 6. Iron Lathe. 7. Physical Laboratory. 8. Drawing Room. 9. Melloni's Apparatus. 10. Blacksmith Shop. 11. Carpenter Shop.

and its Acropolis became more than names when the views of the city and its buildings were presented to the student. The courses in chemistry and physics, from the beginning of the college, were profusely illustrated by the experiments of Professor Doremus, who, in his reputation of a demonstrator, is without rival in this country. Thus the eye has always been appealed to as well as the purely intellectual faculties, and this was the beginning of the advance. Within a few years the practical lessons of the laboratory, workshop, and drawing room have been added and made a part of the course. Some views of these are given in our illustrations.

The main college building is familiar to all residents of our city. It is situated on the southeast corner of Lexington Avenue and 23d Street. South of it a new building, devoted principally to the natural history department, was erected some years ago, and more recently a building devoted to the technical work of the students was erected to the east of the main building. These new departments are the ones illustrated in this issue.

Recognizing the practical, every-day importance of the microscope, the students are instructed in its use. The substances examined by it are principally commercial products. The obvious intention is to give the students a lesson that may be of service in business life, where these products are dealt in. The same is to be said for the blowpipe class, where mineralogy and examination of ores is studied. The construction of the blowpipe from a clay pipe, a cork, and a bit of glass tube will be familiar to some, but probably new to the greater number of our readers. These branches are in the charge of Prof. William Stratford.

For the study of practical and analytical chemistry a laboratory that in many respects is superior to any in the city is provided. The ceiling is very high, and rises in a series of parallel gables running east and west and glazed upon the north slope. These act as a series of skylights, admitting the north light only, and excluding all direct sun light. The effect is the most perfect illumination for work. The room is filled with laboratory tables, each table having its own set of reagent bottles, with name and symbol blown upon the glass of each. At the end of the room is an elevated platform, with lecture table and blackboard, for the use of the professor or instructor in charge of the laboratory. Various details about the desks are worthy of notice. No separate funnel or filtering stands are used, a series of sockets being provided that hold movable supports for the funnel. For every four desks a sink and water faucets are supplied, a distinct advance upon the old system of a single sink for a whole laboratory. Qualitative analysis is taught here; quantitative analysis as yet being given to but few of the students. Balances are, however, provided, so that the laboratory is equipped for both classes of work.

Physical science, as a rule more quickly appreciated by students than chemistry, is practically studied in laboratories devoted to it. Air pumps, gas analysis apparatus, electrical apparatus, gasometers, apparatus for illustration of heat and light, are here all used and handled by the students themselves. Radiant energy is worked at by sections of four or five students at a time with Melloni's classic apparatus. Those who have attended a good course of lectures in physics may form some idea of the work when it is stated that practically the students themselves repeat all the experiments incident to such a course.

Prof. Doremus, in whose charge these two departments are, lectures on the subjects of chemistry and physics, with all the illustrations the college's collections afford. His lecture room, as not appertaining to the students' personal work, is not shown. It is provided with every imaginable appliance, including the great air pump driven by steam.

The practical division, including the laboratories, is directed by Dr. Charles A. Doremus, together with Dr. L. H. Friedburg. The work of inspiring an army of students day in and day out with the magnetism necessary for their work is a most trying one, as any educator can testify. Upon the work of the laboratories, and upon this inspiration, the success of the course depends.

The instruction in drawing on the blackboard, and on paper from relief models, and from memory, is a necessary feature of the programme. Besides relief models, natural history is made to supply subjects. On the boards the structure of mollusks and other types are drawn. In this way the art may be made the exponent of a branch of natural history, and by such reference acquire a new spirit of life and reality.

What we have thus far described is the work in the natural sciences. Practical and useful though the design is, a more striking, because on its face a lower and more every day, form of manual training is next to be considered. In an extensive workshop, wood and metal working are thoroughly taught. Some of the scenes are illustrated.

The treatment of iron begins with forging. The general principles of the art are given by the instructor, with blackboard illustrations. The students then don their aprons, light up their own fires, and in groups work at the assigned tasks. A number of portable forges with hand blowers keep all the students at work. On the occasion of our visit, all the class were occupied chain making. Another day, some other piece of forging would be executed. In this way a knowledge of this most artistic work is acquired. In no art can effects more characteristic of the pure work of the hand be produced. The achievements of the old time blacksmiths in decorative forgings can stand comparison with the work of any artificers.

The blacksmith shop is next to the lathe or turning shop. Here a large number of lathes for metal turning, both speed and engine lathes, are in daily use. Having learned how to forge his material, and acquired some idea of vise work, filing, etc., the final work of turning is taught. From our illustrations, owing to limited space, only an imperfect idea of the number of lathes and completeness of the equipment can be obtained. Between the lathe shop and blacksmith shop is an electric plant for supplying electricity for the general needs of the scientific department.

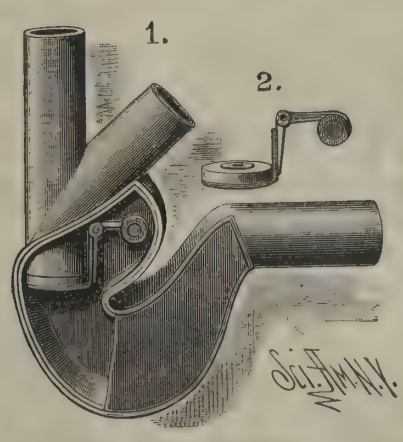
Next to the metal turning lathes come the wood lathes. There are about the same number of these. The students who have gone through the carpenter shop, and have learned joinery, are ready for wood turning. All the lathes are driven by power.

Finally, the carpenter shop is shown. A number of complete benches, with full outfit of tools, give every facility for good work. In this connection the subject of sharp tools is not lost sight of. The students receive special instruction in sharpening their saws, plane irons, etc. For the lessons in saw filing, strips of brass are supplied, which the student files into teeth for practice. This economizes material, and really affords, if anything, a better substance for a criterion of the student's work. The making of the different joints, such as mortise and tenon and dovetail, with other points in carpentry, are features of this course.

Thus it will be seen that the city of New York affords to the sons of her citizens a complete technical training free of all expense. With great judgment the students are not restricted to the regular hours for work in the shops. Late in the afternoon they may be seen bending over the lathes, or carpentering, or doing some other class of work. Yet we believe we risk little in saying that we are disclosing what is to many a new fact—the existence of such an opportunity for the poorest as well as the richest of the city's future citizens. The work of the college has been done so quietly and unostentatiously that less is known of it than should be.

PLUMBER'S TRAP.

The annexed engraving represents an improved plumber's trap, especially designed to prevent sewer gas from entering the house through the waste pipe. The horizontal waste pipe extends from one arm of the D-trap, while the vertical main outlet pipe enters the other arm. From near the end of the outlet pipe extends a branch overflow pipe. One side of the trap is closed by a plate which may be removed for clearing the trap or repairing the valve. The upper part of the trap, where it connects with the waste pipe, is on a higher level than the lower end of the outlet pipe, which is, therefore, always water sealed. The trap is formed with an upper chamber, within which the valve is placed. The valve proper, Fig. 2, is composed of a plate bent at right angles. Secured upon the upper surface of the lower portion is a packing of leather or other soft material to form a tight joint with the lower end of the outlet pipe when the valve is closed. The upper portion of the plate is connected to the



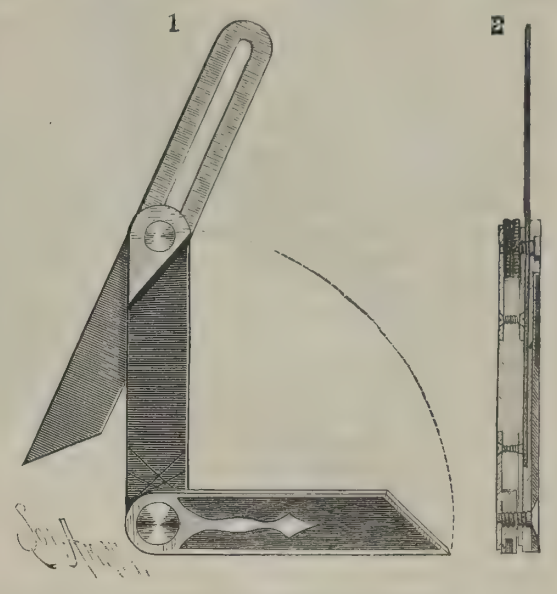
GERSTENBERG'S PLUMBER'S TRAP.

lower arm of a bell crank, through the angle of which the valve is pivoted to a stud projecting from one side of the chamber. The other arm of the bell crank is provided with a weight which overbalances the lower part of the valve, so that the latter will close automatically when the water stops flowing from the main outlet or overflow pipe. Any gas that may find its way through the water retained in the trap will be prevented from entering the outlet pipe, and any pressure that might result from accumulated gas in the trap would only serve to force the valve more firmly against the end of the pipe.

All further particulars concerning the invention may be obtained from the patentee, Mr. F. C. Gerstenberg, of 1107 First Avenue, New York City.

IMPROVED BEVEL.

Upon each side of the body at the ends is secured a brass plate having a circular projecting portion. The plates upon one side are formed with circular apertures centrally made in the projecting portions, while the plates upon the opposite side are formed with square



WITTER'S IMPROVED BEVEL.

apertures. Pivoted upon a screw bolt passing through these apertures are the two blades, shaped as shown in Fig. 1; Fig. 2 being a sectional view, showing the blades folded in suitable recesses provided in the body. Each bolt is provided with a circular thumb nut, having milled edges and a groove cut centrally around its edge to facilitate turning. The nuts may be further tightened by means of a nail set inserted in a hole made in their edges. The blades will be securely held in any desired position by these nuts. Near the pivotal point of the short blade, the top plate of the body is provided with gauge lines, to which the blade may be adjusted when it is desired to cut on a square or at an angle. The short blade is especially useful in working from plans, as both blade and handle are brought close thereto. Then, as the bevel is turned over to mark the wood, the thicker part of the handle is brought against the board to be cut. By the use of two blades in combination, almost any angle may be obtained, and in cutting hips, valleys, and jack rafters the small top blade will be found especially useful. It will be seen that the means for tightening the blades are entirely out of the way, and not liable, therefore, to form an obstruction in handling the tool or become broken or disarranged from a fall.

This invention has been patented by Mr. Frank E. Witter, of Brooklyn, Conn.

Naval Architecture During the Last Half Century.

The annual lecture under the auspices of the Greenock Philosophical Society, to commemorate the birth of James Watt, was delivered in the Watt Lecture Hall, Greenock, on January 14, by Mr. Robert Duncan, shipbuilder, Port Glasgow. The title of Mr. Duncan's paper was "Evolution in Naval Architecture during the Reign of Queen Victoria." After referring to the early history of marine engineering, and to the intimate connection of Greenock and the Clyde with its initial stages, Mr. Duncan went on to say that up to the date of her Majesty's accession in 1837, no systematic attempt at ocean navigation by steam had been made. In 1812 steamship building began, but it was not till 1838 that the first Atlantic steam communication began. The Sirius and the Great Western made the voyage to and from New York at the same time, in the middle of that year, in fourteen and seventeen days respectively, under steam all the way. Mr. Duncan then traced rapidly the evolution of the iron ship, through the various modifications of design and proportion, and the simultaneous and consequent evolution of crafts to adapt themselves to the rapidly changing conditions. Mr. Duncan also described the influence upon the forms of ships of maritime law and of Lloyd's rules—evolution in size from the short square boxes of the early periods to the long narrow vessels of to-day; the Enterprise, for example, the first steamer to make the voyage to India by the Cape of Good Hope, being only 122 feet long, while now the cargo carrrying steamer is over 400 feet long, and the express passenger ocean steamer over 500 feet. Mr. Duncan considers it possible that, ere her Majesty's reign closes, the Flying Scotchman of the sea will reach a length of 800 feet, and a speed of twenty-five to thirty miles an hour. The evolution of the man-of-war was next described, an interesting sketch given of the science of naval architecture, and a bibliography of the subject.

Best Effects in Paper.

Many of our subscribers have asked us to reprint our article on the best effects in papers, and in accordance with their desire we herewith insert it.

"*Bedrooms.*—Small-figured light paper touched with gold, and a border not too dark for the walls. For the ceiling, a single point, or a delicate tint with small figure. If stile and decoration are used, the effect is better to match the color of the decoration and side wall border as closely as possible. The stile may be a trifle darker than the center.

"*Dining Room.*—Lincrusta Walton, leather, or, if something cheaper is desired, some imitations of these are very good. This room can bear and will be improved by a much heavier finish than most others. Paneled ceilings, with corners or squares containing game or fruit pieces, trimmed with binders, or wood mouldings, are handsome and popular. A well covered center is serviceable for the ceiling. If a dark carpet is used, the paper should be at least three shades lighter. Never put on a Pompeiian shade of paper with a bright red or maroon ground carpet, as one color kills the other.

"*Library.*—The most *recherche* style for this 'heart of the house' is Pompeiian red paper with frieze of gold or yellow figures, and copper moulding for hanging pictures under it. A ceiling with center of light buff, stile of mustard yellow, decoration of Pompeiian red, or blue and gilt, with figures of the opposite color on it, cornice in tints of Pompeiian red, yellow, mustard and blue.

"*Hall.*—The prettiest and most desirable papers now in use for our halls are geometrical figures in light colors and gilt. A very popular shade nowadays is called 'biscuit (just the color we like to see our soda biscuits as they come smoking from the oven). It is used with a frieze of flowers, or a Persian design, matching the side wall in color.

"*Parlor.*—This, of course, is the best room in the house, usually, and should have the best paper, and your customers, no doubt, will be more particular with this than any other room.

"A good plan is to go by the woodwork, as, for instance:

"*Maple Wood.*—Use a yellow, ivory colored paper, with a ceiling paper of bluish tint and a little gilt.

"*Cherry, Natural or Colored.*—Advise your customers to use old gold paper or 'metals' for side wall, and blue or white ceiling.

"*Mahogany.*—A light terra cotta pink for side wall, and a paper for ceiling with a light silver green metal in it.

"These suggestions are the proper thing for the parlor, as in this room, especially, the colors should harmonize.

"One very important thing in this room is a frieze, as it bears the same relation to a side wall as a cornice does to a house. It should give dignity to a room, and should be wide enough to admit of ornament that will not seem cramped or insignificant when seen from the floor.

"If the ceiling is nine feet high, use a frieze of eight or nine inches wide; if ten and one-half or eleven feet, you can use a frieze of fifteen or eighteen inches in width. Do not use a conventional design above a wall paper whose pattern is flowered, or *vice versa*.

"*Kitchen.*—Last, but not least. There you may depend pretty safely on 'Biddy's' ideas. For know, O ye paper men! that if you please the cook, your men will not go out of the house hungry, especially if they *happen* to finish the kitchen to the very last scrap of papering about dinner time."—*Wall Paper T. Journal.*

It has been calculated that if 32,000,000 persons were to clasp hands, they could reach around the globe.

Bedroom Decoration.

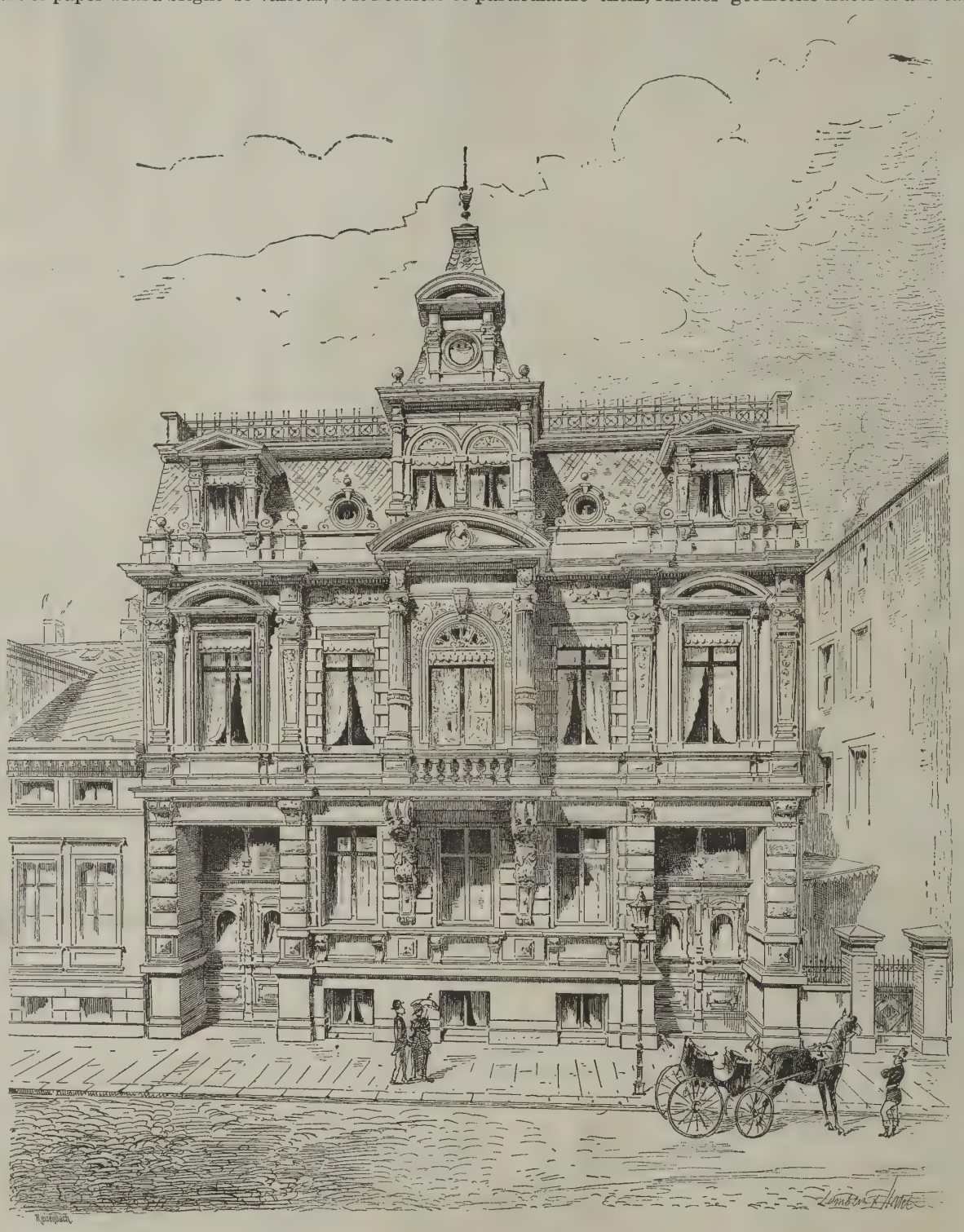
In the best apartments paper hangings are generally selected chaste and handsome, with satin grounds, the figures in subdued colors, yet to harmonize with the hangings; the borders, at top and bottom of the rooms, of paper, unless India paper is used; in that case, gold moulding. I have to notice the prevalence, of late years, in leaving out borders entirely to papered rooms. This arose from two motives, viz., economy and the previous use of extravagant heavy broad borders, which certainly were too preposterous to continue in favor; these causes led to an extreme change, by borders being excluded altogether. This erroneous style is now corrected, persons of acknowledged taste adopting chaste, embossed kinds, such as are in imitation of gimp, shaded lines, moulding, etc., for giving a finishing effect to the tops and bottoms of papered rooms, the paper being fitted close to the sides of doors and windows.

The materials suitable for hangings to bedrooms are so various, it is needless to particularize them, further than that those for the family use may be of highly glazed chintz, of which we have now many beautiful patterns, or of damask, or morone; the colors, crimson, barre, deep yellow, and light morone; these give a warm effect to the apartments. Light green and blue are also frequently used. The fitting up of these apartments may be plain, but full and handsome; if moreen is the material, folded valances are appreciable, in preference to drapery; but damask being soft and pliable, it is well adapted to form any drapery that may be desired. Silk fringe and trimmings, in the same colors, are quite as elegant, and more tasty, if not so showy, as contrasts.—*Paper Hanger's Companion.*

Prof. Vaughan's discovery of a very poisonous ptomaine in cheese, ice cream, and milk undergoing certain chemical changes has been confirmed by a number of investigators in various parts of the country. Vaughan's suggestion that tyrotoxicon may be found to be the poison which produces cholera infantum opens up a new field for investigation, in which every physician must of necessity be interested.

An American's Jubilee Gift.

There is now being built in the Rother Market, Stratford-on-Avon, a structure to combine within itself drinking fountains for men, cattle, and dogs, and a four-dialed illuminated clock, with chimes, the whole being presented by Mr. George W. Childs, of Philadelphia, an American citizen, as a jubilee gift to Stratford-on-Avon. The monument, which is being carried out by Mr. Bridgeman, of Lichfield, according to the design and under the superintendence of Mr. Jethro A. Cossins, architect, of Birmingham, will be about fifty feet high to the summit of the vane. It is composed of three stages, and is crowned by a circular spire of concave outline, flanked by four spirelets, each with gilded terminals. The structure is square in plan, with massive diagonal buttresses at the corners. In the base are the troughs and basins of the fountain, all of polished Peterhead granite. Over these, on the four sides, are pointed moulded arches on columns with carved capitals. The tympanum of each arch is filled in with geometric traceries and carved foliage. In each of the four rectangular spaces beneath the springing lines of the arches are inscriptions, all of which were selected and arranged by Dr. Macauley. In the second story are arcades of three arches, with circular turrets at the corners, and in the upper story the four dials of the clock, under enriched gablets, with finials representing mustard-seed, cobweb, moth, peas-blossom. The buttresses of the lower story terminate in lions and eagles alternately, bearing shields with the arms of Great Britain and with the stars and stripes of the United States. With the exception of the granite basins, steps, and plinth, the whole is to be erected in a fine-grained, very hard, and durable stone, of a delicate gray tint, from Bolton Wood, in Yorkshire. The memorial stone near the base was recently laid by Lady Hodgson.



GERMANY—CITY RESIDENCE OF HERR WINDESHEIM, AT HALLE—F. THIERICHENS, ARCHITECT.

Planting of Trees and Shrubs.

More failures occur, in my opinion, through deep planting than from any other cause, and yet it is far wiser to err on the right side, and plant too shallow than too deep, for in the former case the plant can assist itself, in the latter it is helpless. The roots of plants, as well as the parts above ground, want air and warmth, and if properly accommodated, will soon adapt themselves to the place in which they are to grow. If the surface soil is naturally dry, the roots will run down after moisture, and if it is wet, they will spread near the top, but in no case can a tree or plant, except such as strike root at every joint, flourish if the collar is much below the surface. In planting small trees or shrubs, over which the wind has no power, there is no excuse for deep planting, not even the plea of saving trouble, yet we often meet with even small shrubs planted far too deep.

Of course, all trees over a certain height require to be made firm by staking, or some other method, to secure them from the effects of high winds; otherwise much injury frequently occurs.—*The Garden.*

Disinfection for the Household.

The importance of disinfection of bedding, clothing, and other personal and household articles in contagious diseases demands that health authorities should have under their control establishments where disinfection can be carried out on a large scale and at public expense. Such institutions are now in use in Berlin, Dusseldorf, Gottingen, Strassburg, Breslau, Leipzig, Danzig, and other cities in Europe. The results are pronounced to be exceedingly beneficial. Steam under pressure is regarded as the best disinfectant.

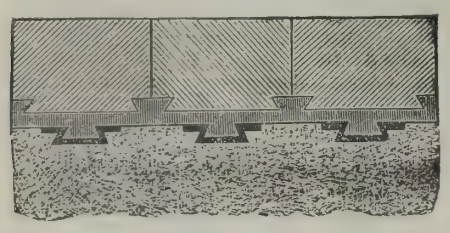
THE HOME OF MILTON.

"HYDROFUGE" FLOORS.

The special features claimed are :

1. Perfect, direct keying of the wood to the concrete (not the bitumen) by means of a hard setting mastic or bituminous composition, which runs into the undercut recesses, both of wood and cement, and dovetails them securely together (see illustration).

2. The difficulty of cutting or making satisfactorily the undercut grooves in the cement is overcome in some cases by introducing specially made corrugated iron channels, and fixing them into the stratum of cement while the latter is still plastic, the very shape of the iron channels holding them firmly in the cement, the straight flange of the iron effectually protecting the edges of the latter against breakage while the



builder's work proceeds. The iron channels are not intended for removal.

3. The "Hydrofuge" is a system by which a "parquet," or wood block, floor can with safety be laid on a concrete foundation, as there is no possibility of detachment, even if the blocks or parquet should shrink.

LADDERING A TALL CHIMNEY.

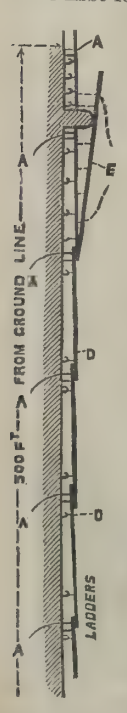
Fifty years ago Messrs. P. Dixon & Sons, of Shaddongate Cotton Mills, Carlisle, built a tall chimney shaft, which is a landmark for miles around, in connection with their factory. This shaft is described in Bancroft's treatise on "Tall Chimney Construction" as being of the following dimensions :

Height from foundation to top, 320 ft. 6 in., and from ground line, 300 ft. ; outside measurement at ground line, 17 ft. 4 in., and inside measurement, 9 ft. 6 in. ; outside dimension at top, 9 ft., and inside at top, 6 ft. 8 in. ; built to a batter of 1 in 72. Being the fiftieth year of this tall shaft, Mr. Robert Todd, woolen manufacturer and present occupier, is having it repaired, and a new copper rope lightning conductor fixed up the outside. Mr. Joseph Ball, known as a chimney and spire restorer and lightning conductor fixer, of York Castle, Oldham, is doing the work.

In carrying out this difficult undertaking, the ascent to the top of the shaft has been made by fifteen wooden ladders of the ordinary type, as used by painters, specially made light and strong for the purpose, and weighing from 20 lb. to 50 lb. each, according to their length, and of the average width of 11½ in. at bottom, and tapered to about 10 in. at top. Distance pieces of wood are fixed at the back of the ladders at top to keep them from the brickwork, thus providing a good foot and hand hold for the workmen.

The procedure of laddering is as follows :

The first length or section of ladder is placed at the base of the chimney shaft, and a hooked wrought iron dog or holdfast, made from ⅞ in. round rod, about 9 in. long, is driven firmly into the brickwork 4 ft. from the bottom of the ladder, and a second iron dog driven into shaft about 4 ft. down from top of the ladder, to which dogs the ladder is firmly lashed. The dogs are formed so as to prevent the lashing of the ladders from slipping when any strain comes upon them—see the annexed engraving. Having lashed the first length, the next step is to place a free ladder against it. This the workman climbs until he can reach about 4 ft. above the fixed length. Here he drives into the brickwork an iron dog, and attaches a pulley block to the same ; then one end of the rope reeved round the sheave is brought half way down a second loose section of ladder placed by the side of the first, the rope being fastened ; the second length is hauled up by workmen at the base of the shaft until it is half its height above section No. 1; it is then temporarily lashed to the fixed length, and Steeple Jack climbs up and drives another holdfast into the brickwork 4 ft. above its (the second length's) top. He then shifts the pulley block to the upper holdfast and descends. Length No. 2, still attached to the rope at its middle, is then hoisted above the first length fixed, which it overlaps two rounds, and the top of No. 1 and bottom of No. 2 are then securely lashed together, and No. 2 then forms a continuation of the first fixed length. The climber mounts No. 2 length, which is still held by the pulley block and rope, and drives in a holdfast above, shifts the pulley block, and proceeds with No. 3 as he did with section No. 2, and so on until the under side of cap is reached, and here a difficulty presents itself. In Messrs. Dixon's shaft, at about 10 ft. down from the top, a stone cornice



projects 3 ft. The length of ladder coming close underneath this cornice or cap was fixed very firmly. Another length was hauled up until its top was about 5 ft. above the cornice, and then this slanting length was secured to the length below at its foot, at intermediate points, and also close underneath the cornice, by lashings or ropes specially made. In climbing this slanting length the workman's back is toward the ground. A last length of ladder is hauled up and fixed above the cornice, reaching to the top of shaft, and to the bottom of this the top of the slanting ladder is firmly fixed as an additional security, thus completing the laddering of this tall chimney shaft. The whole operation of thus climbing the 300 ft. was accomplished in five hours.

The shaft is now being pointed with mastic about 50 ft. down, and two cracks which are on opposite sides of the chimney, and extend to the bottom, are being repaired.—*The Engineer.*

Stained Glass.

The nineteenth century has witnessed great advancements in the art of making stained glass windows.

The recent improvement in the manufacture of colored glass enables the artist of to-day to reproduce his designs in glass without the aid of enamels or heavy brush work. The result is an increased brilliancy and gem-like quality of his work.

But in order to put his designs in glass, the artist must have an especial training for it, and give his personal supervision to the work.

When, therefore, artists who have had a long and careful training in their specialty and personally attend to the reproduction of their designs, the conditions are favorable for the very best work. The productions of Messrs. Bray & Breck, of 37 Province St., Boston, point to just such conditions. Their careful training in every department of art stained glass, and their personal attention to every detail of their business, enable them to turn out excellent work.

By their invention on glass mosaics, which they have patented, they can reproduce the most beautiful designs without the aid of brush work.

They also manufacture brass and copper faced glass mosaics for hall lanterns, etc.

Adamant Wall Plaster.

From the remotest time the material now in use as a wall plaster seems to have been the only preparation used for finishing the interior walls of buildings.

That the varying proportions of quicklime, sand, and hair, with the too frequent unsatisfactory result of their combination, should have so many years afflicted a long suffering people is truly a wonder. It was reserved for Prof. Carl Straub, of Syracuse, N. Y., to perfect, after years of experimenting, a wall plaster in which none of the disappointments of the ordinary mortar occur. This material, which the inventors called Adamant Wall Plaster, is now being manufactured by the Adamant Manufacturing Company, of Syracuse, N. Y.

From the strong testimonials given by all persons who have used it, including architects, builders, contractors, and property owners, we are convinced that this adamant is destined to revolutionize the business of house plastering. The Adamant Company manufacture all grades, from the sand or common finish to the finest grade of marble or hard finish.

Some of the advantages which the adamant possesses above the other plaster is the extreme hardness of the wall. It will neither crack nor crumble, it is a strong support to a building, it does not swell timbers by an absorption of the moisture, as the material itself absorbs most of it, it dries so quickly after it is applied to the wall that in a few hours the frost does not affect it, it can be used without interfering with other mechanical work, it is ready to put on at a moment's notice, avoiding delay in waiting for lime to slake, and it can be mixed in the room where the plasterers are at work.

The extraordinary tests to which the adamant has been subjected to prove its strength and density will strongly commend it for use in churches, school houses, asylums, hospitals, and in all places where there is danger from falling ceilings, or removal by carelessness, or absorption of germs of disease. The adamant is much stronger than ordinary mortar, at the same time it is not nearly as heavy, that is, does not require so great bulk. It adheres to wood, iron, brick, or stone, and becomes as hard as stone in a few hours after it is applied.

Passenger Lift for the Eiffel Tower.

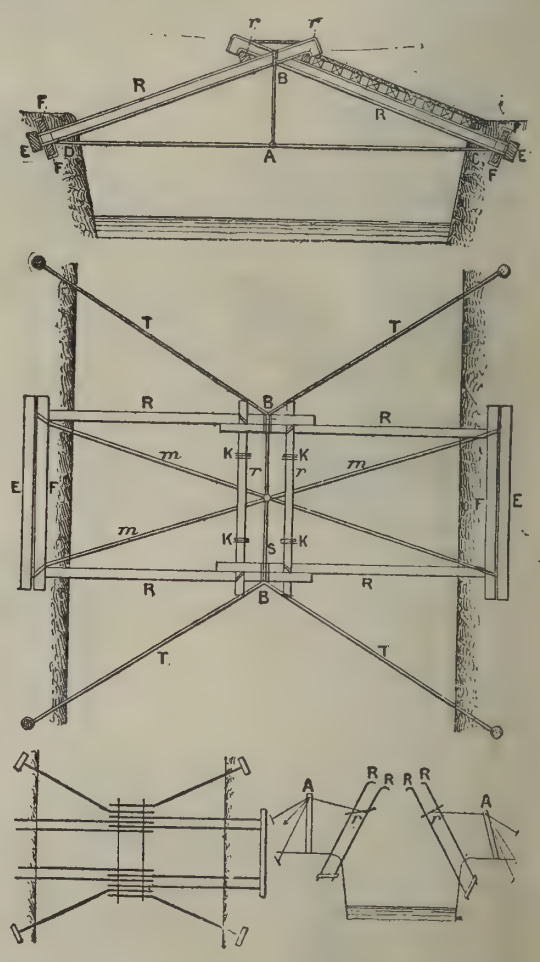
The enormous height of this tower renders a hydraulic lift, in which passengers could perform the whole journey in one operation, quite impossible ; and a succession of shorter lifts, requiring frequent changes, would naturally be considered too cumbersome by the public who will use the tower. On the other hand, the employment of a winding engine and a lift similar to those used in mines would not be sufficiently safe, and for these reasons M. Eiffel has devised a new type of lift, in which the whole ascent can be made in one journey, while at the same time it presents absolute safety. The main idea of the lift is that of a huge screw and nut. Below the lift cage is placed a trolley, with three or more wheels running upon an equal number of rails, which ascend spirally, and thus form a screw having so many threads. The trolley will be revolved either by an electric motor or by a water engine ; but the cage will be prevented from revolving by guide bars. Thus the passengers will not feel anything of the rotary motion of the trolley underneath, and by selecting the pitch of the screw sufficiently small, any degree of safety against a too rapid descent can be obtained.

TEMPORARY BRIDGES.

While in the field, in European countries, the army always has rails, ties, and telegraph poles at hand. It is by means of these three objects that I have undertaken to construct a simple, strong, and quickly built bridge.

I would remark that iron rails are not indispensable, and that, with pieces of wood of proper dimensions, we may reach the same result.

Say we want to cross a river, and have the above named materials. It may be readily seen from the annexed figures how the bridge is built. As the rails, R R, are connected in pairs, the distance apart, D C, cannot increase much. At all events, abutment cross ties, E E, and two cables, *m m* and *m m*, are there to preserve such distance. The cables may, if desired, be easily and substantially made of iron wire. If the case is urgent, an article good enough for ordinary use may



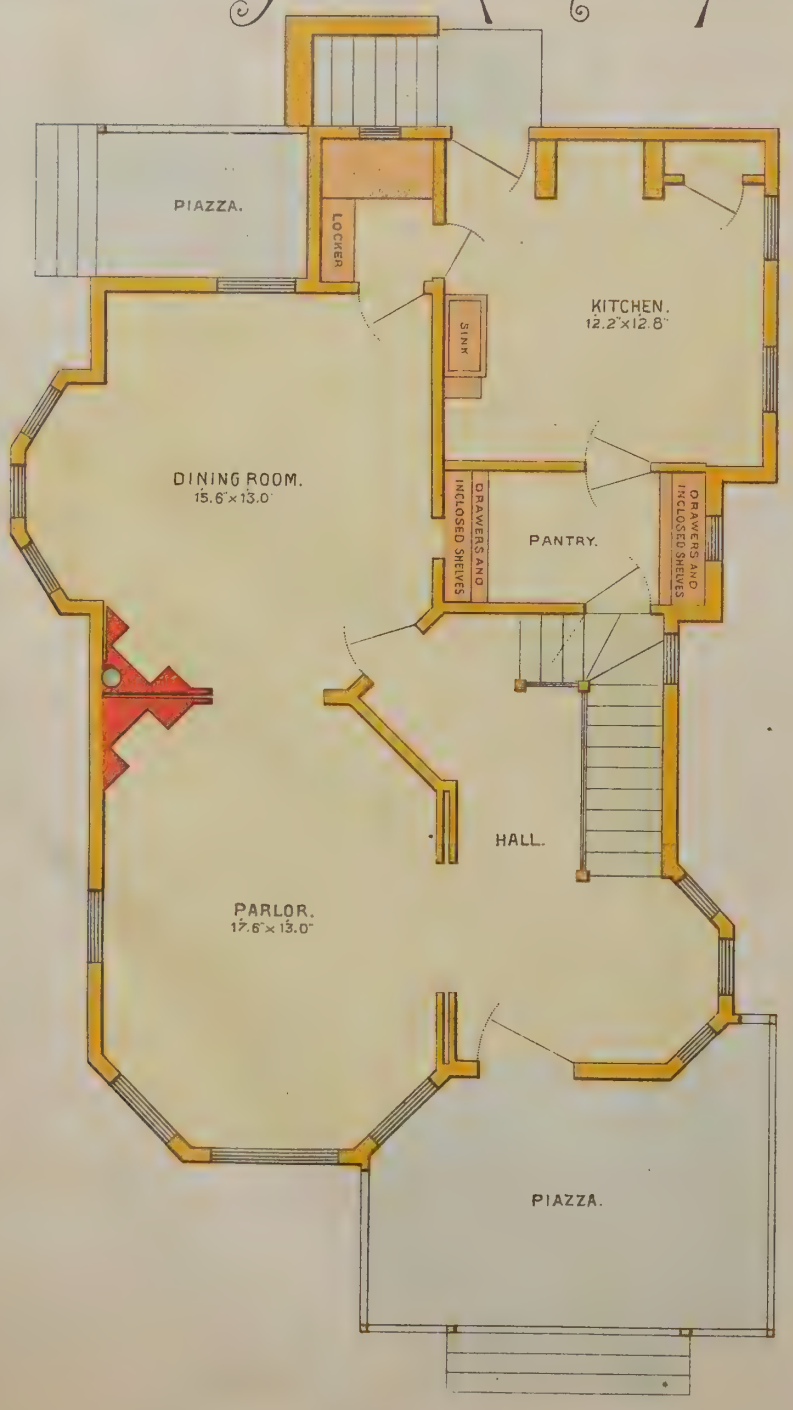
be manufactured *in situ* with no other tools than a stick and two pickets. The transverse distance from R to R is maintained through ties placed between F and F, and kept close against the rails by other cables that may be readily stretched. So too, above *r* and *r*, there are other ties which are fastened to the latter with wires, K K, and which the cable, S, holds tightly pressed against R and R. T, T, T, T are guys for steadying the structure.

It will be remarked that, taken at other points, these arrangements may be extended or reduced. I give the principle only.

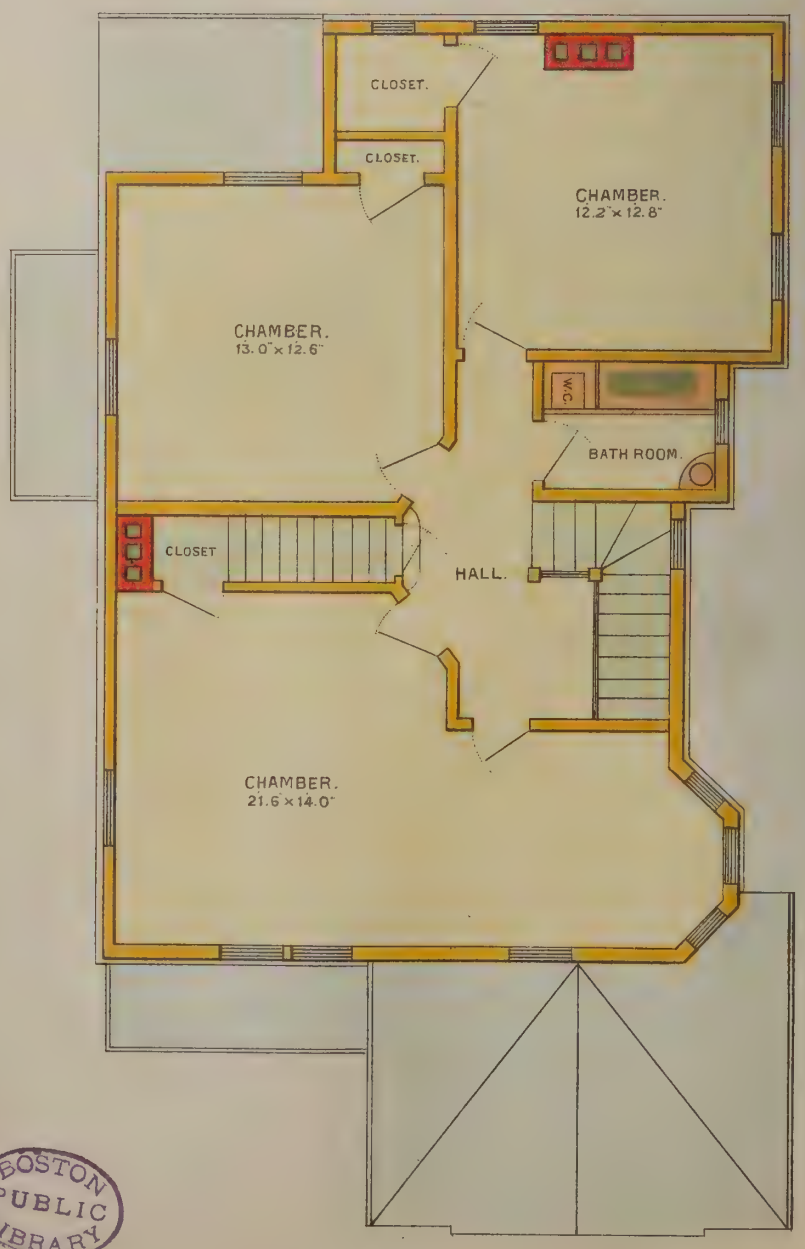
If we admit a pitch of one meter, and a loss of one meter at each extremity of the rails, we shall have : Halt span $x = A\,c = \sqrt{25 - 1} = \sqrt{24} = 4{\cdot}8$ meters. Span = 9·6 meters.

Now, such a length seems too great for anything stable. We may, nevertheless, consider five meters as capable of being passed over conveniently. For great loads, all that has to be done is to double, or even treble, each side, R R, in the following way, and (since, as I have said, I do not use 9·6 meters) to employ the following artifice for giving still further stability : As we are supposed to have wire in quantity at our disposal, it is useless to say that we can render the system thoroughly steadfast. A word as to the simplicity of construction. A and A are two short sheers that serve for bringing opposite each other the two systems, R and R, which at once fit into each other. The cross piece, *r r*, has been fixed, and serves to connect, lay, and support R R. Instead of being of wood, *r r* may be pieces of rail. The pieces, R R, may be bent at the end, as shown in Fig. 3, by means of a forge.—*E. D., in La Nature.*

A FOUR THOUSAND DOLLAR COTTAGE.



Plan of First Story.

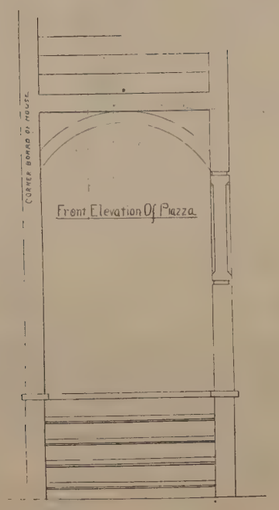


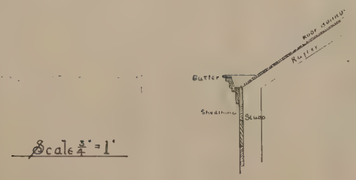
Plan of Second Story.

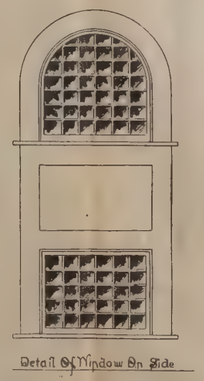
SIDE ELEVATION.

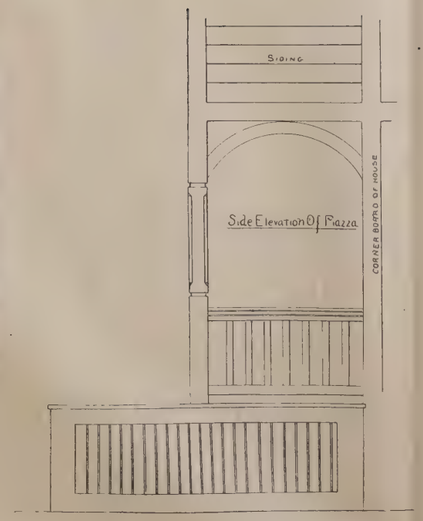
A $1,200 Double House at Fort Madison, Iowa.

FRONT ELEVATION.





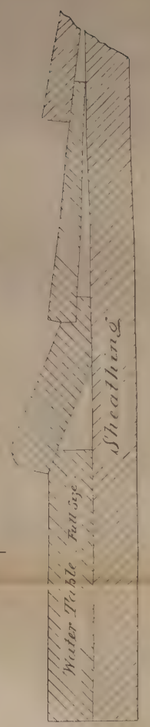


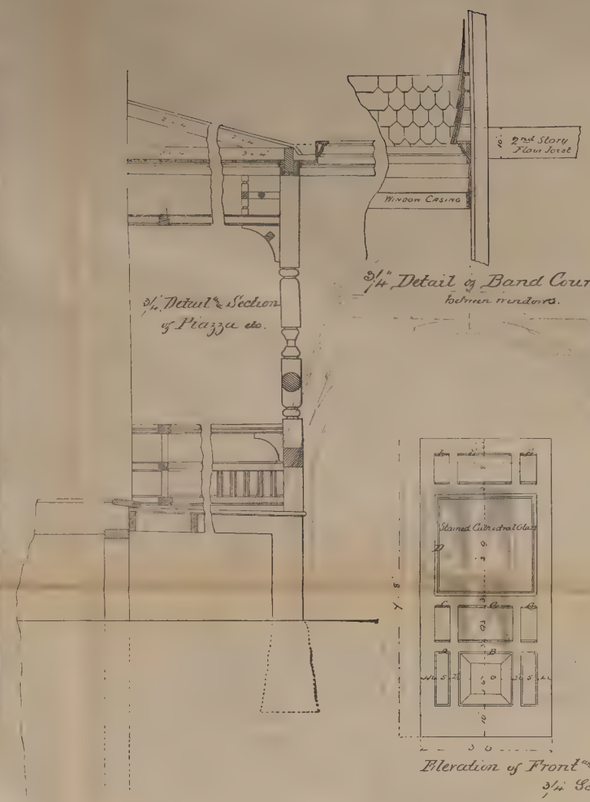


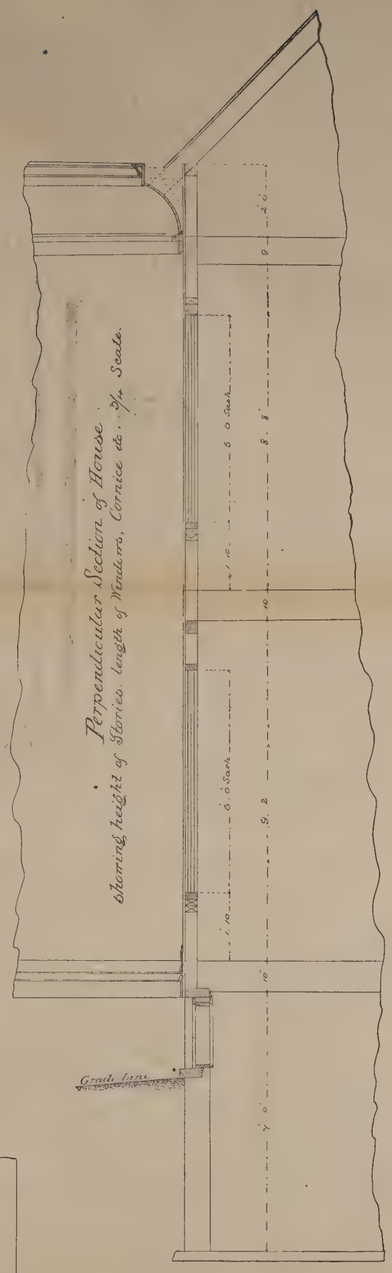
Details to accompany Colored Plates. For description see Architects and Builders Edition of Scientific American for August, 1887

A $4,000 House at Flushing, N. Y.

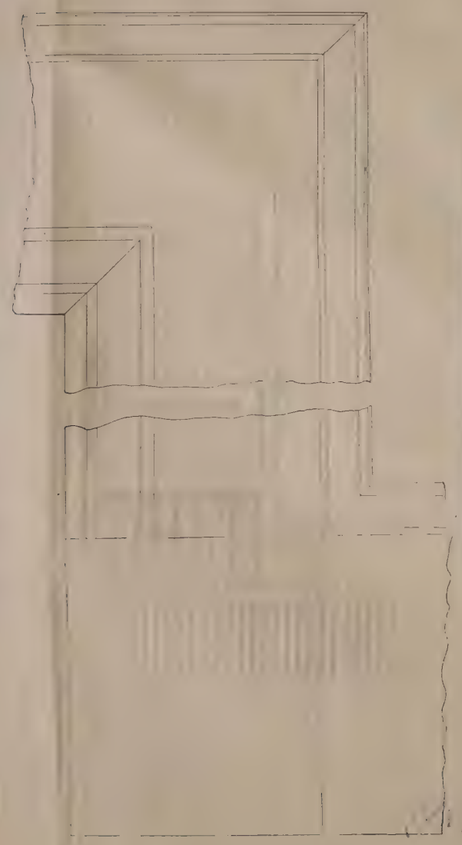
Front Elevation.

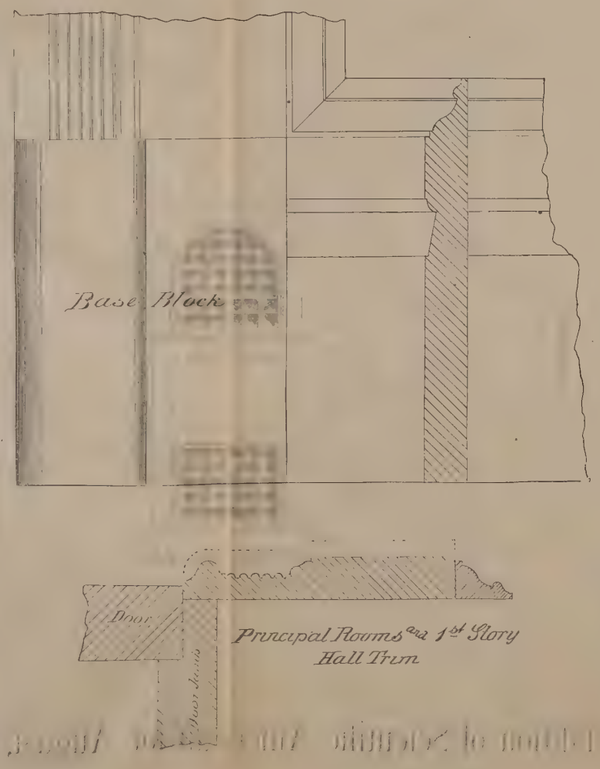


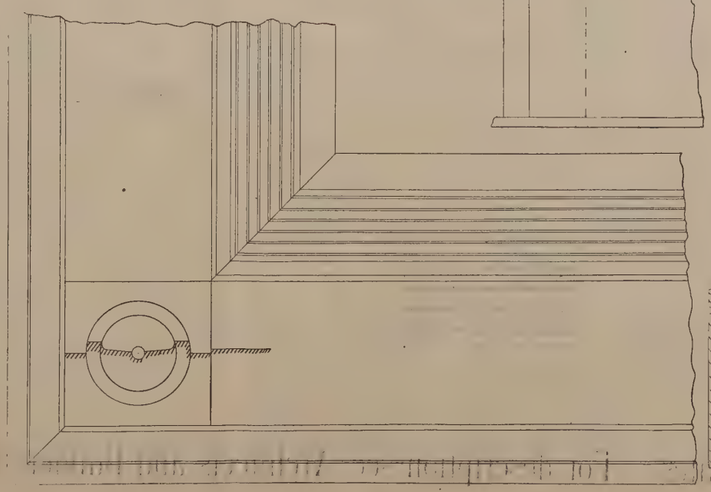


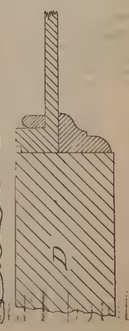


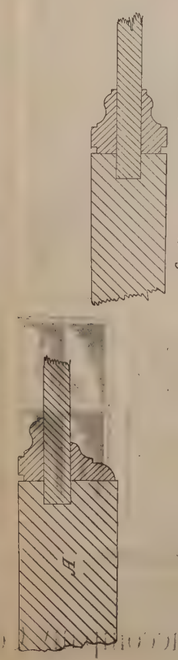
Side Elevation

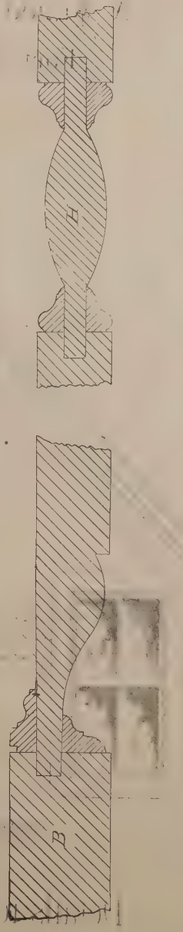


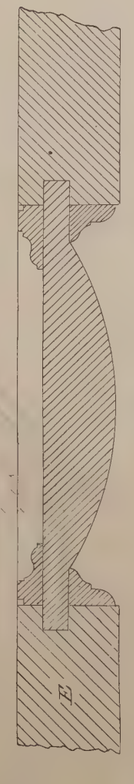












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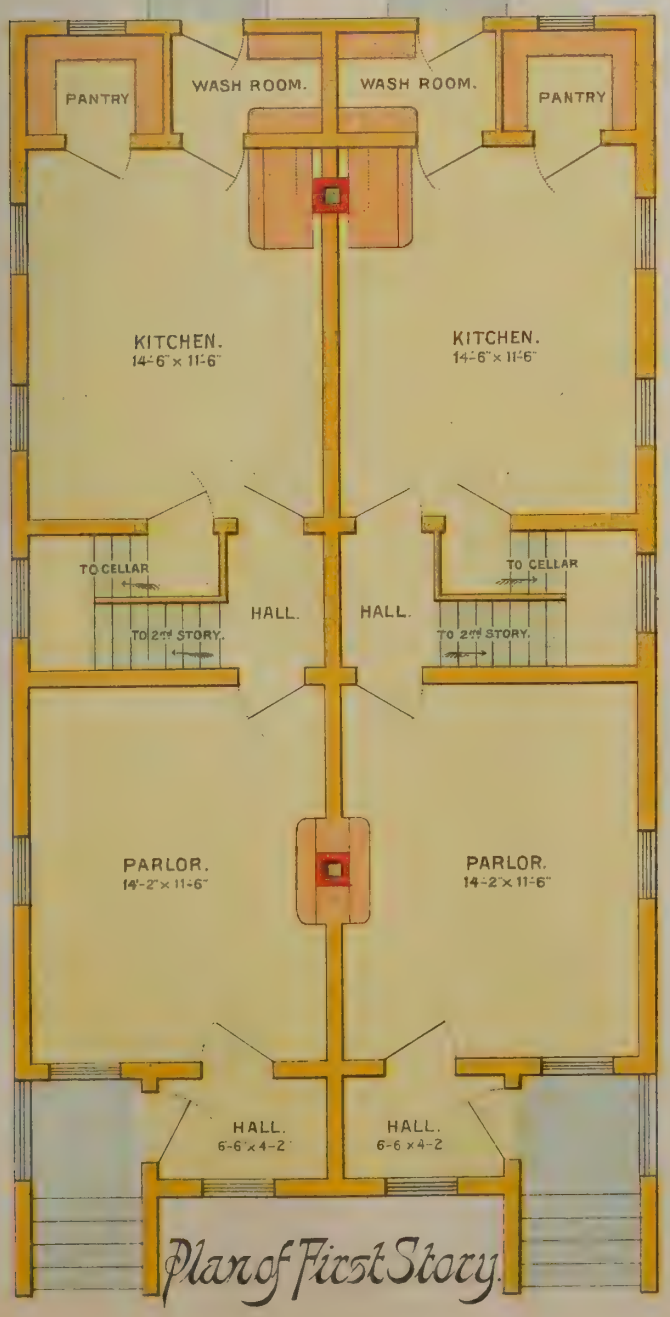
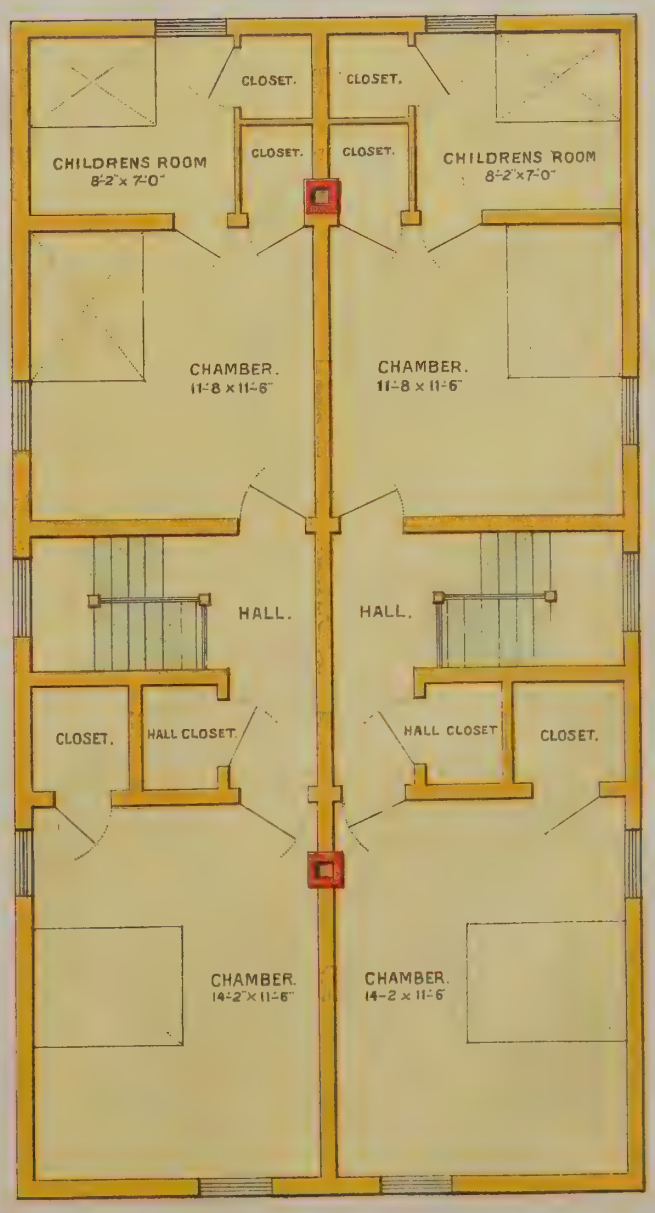
A FOURTEEN HUNDRED DOLLAR DOUBLE HOUSE.



Plan of First Story.



Plan of Second Story.

SCHUMACHER & ETTLINGER, NEW YORK.

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Scientific American.

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THE

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CONTENTS

Of the September number of the ARCHITECTS AND BUILDERS EDITION of SCIENTIFIC AMERICAN.

(Illustrated articles are marked with an asterisk.)

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SPECIFICATIONS AND ESTIMATE FOR A TWELVE HUNDRED DOLLAR COTTAGE—COLORED PLATE, SEPTEMBER, 1887.

SPECIFICATIONS AND DRAWINGS.

The specifications and drawings are intended to co-operate, so that any work shown on the drawings and not mentioned in the specifications, or *vice versa*, is to be executed the same as if mentioned in the specifications and set forth in the drawings, to the true intent and meaning of the said drawings and specifications, without any extra charge whatsoever.

The drawings, taken in connection with this specification, are intended to provide for the completion of the entire carpenter work, mason work, tinning, painting, etc., as well as everything mentioned in this specification.

Quality.—All the material used to be of good quality, free from all defects impairing its strength or durability.

All timber, except where otherwise specified, to be of good, well seasoned hemlock.

Sizes.—Girders to be 4″×8″, flush with top of beams; sills to be 2″×8″; plates and interties, 4″×4″; posts to be 4″×4″; first and second floor beams, 2″×8″, all 16″ on centers; collar beams, 2″×4″; rafters, 2″×5″; hip and valley rafters, 2″×8″; 24″ on centers; all studding, 2″×4″; 16″ on centers; bearing strip, 1¼″×6″; ridges, 1″×8″.

Framing.—All studding placed 16″ on centers. All door and window studs to be doubled, bridged once on each floor. Partition studs to rest on partitions below, where possible, and not on the floor beams. Spike a 2″×4″ beam to side of girder for floor beams to rest on and spiked well thereto. All headers and trimmers to be doubled, all beams under partitions running parallel with the same to be doubled; the entire frame to be mortised and tenoned and pinned together. Sills to be halved at corners and well spiked together. Studs to run from sill to plate and to be notched out 1¼″×6″, and ribbon well spiked in for second tier of beams to rest on.

Flooring.—First and second story floors to be laid with narrow spruce flooring, well driven together and nailed to each and every beam.

Siding.—Cover entire building, except where otherwise shown in the drawings, with sound knotted, narrow novelty boards, nailed every 16″, and set nails for putty. Do all necessary furring. Shingle the vertical sides where shown with XXX 18″ pine shingles, laid not more than 5″ to the weather. All vertical shingles to be laid in straight lines and style shown on plans.

Roof.—The roof is to be lathed with 1″×2″ spruce lath; valley and gutters to be lined with the best I C charcoal tin; all joints to be carefully soldered. Do all necessary flashing around chimneys, dormers, porches, etc, also counterflash all chimneys and junctions. Shingle the entire roof with 18″ pine shingles, not more than 5½″ to the weather. Furnish and put up where required 3″ tin leaders, connected with cistern where directed.

Piazza.—The sills and bearing timbers for porches to be 3″×6″, floor beams 2″×6″, placed 20″ from centers, notched into the sill and well nailed; the floors to be 1″ thick, 4½″ wide, laid in white lead and blind nailed. Steps to have 1¼″ treads and ⅞ risers; the roof to be sheathed and tinned; columns, plates, balusters, ceiling, etc., to be white pine, worked and trimmed as per details. The piazza to be ceiled on the under side, part raked and part on level, with 3″ beaded ceiling, ⅞ thick, beams 2″×4″. Front steps to be built as shown on plan, with 1¼″ strings and steps, ⅞″ risers. Use two rough strings between face strings.

Blinds.—All windows, except cellar, to have 1¼″ outside blinds, made, hung, and fastened with spring fastenings in the best manner, painted at the factory three coats.

Exterior.—The water table, corner boards, cornice, window frames, bay windows, porches, and all other exterior ornamental work to be made of the best quality of white pine, in accordance with the drawings and details.

Windows and Door Frames.—Window frames to be made for 1½″ double hung sash, with 1¼″ pulley and hanging stiles; 2″ sills and ⅞ sub-sills; 2″ axle pulleys, stops, etc., all complete. Small cellar frames to be made with rabbeted frames, cased inside and hung at top with 3″ narrow butts and proper fastenings. Hanging stiles to all windows will be 4½″ wide. Door frames to be made of 1¼″×4½″ outside casings.

Sashes.—All sashes, except cellar, to be 1¼″ thick, dimensions and the number of lights as shown in the drawings; to be glazed with second quality French single thick glass; cellar to be glazed with third quality. The double hung sash to have best Russian hemp cord, proper weights, and Berlin bronze sash fasts, size and number as per plans.

Doors.—The front doors to be 1½″ thick, moulded as per plans, with two panels of plain glass hung with 4½″ cast loose butts, fastened with 4½″ mortise lock, night latch attachment, brass face, white porcelain furniture and escutcheons. Closet doors 1¼″ thick, paneled and moulded one side, hung with 3½″ cast butts, fastened with 5″ reverse bevel rim lock, white porcelain furniture, etc. The back door to be 1½″ thick, secured with mortise lock and two 4″ barrel bolts, placed one above and one below the lock. All other doors, not otherwise specified, to be 1½″ thick, double faced, with mortise locks, furniture to match that heretofore specified When setting jamb all doors must be hinge and lock blocked.

Stairs.—Build the stairs as shown on the plans, from first to second story, with 1¼″ treads, ⅞″ risers, and 1¼″ strings, to be put up in the best manner, the steps to be wedged with glue and supported on strong carriage timbers. Newels, balusters, and hand rails to be made of ash as per details Cellar stairs to be rough spruce plank steps housed into strings. Fur off all soffits of stairs complete for lathing.

Trimmings.—The architraves for all doors and windows throughout the house to be made 4″ wide, plain face. The bases to be 6″ wide with ⅞″×1″ moulding on top; all to be of well seasoned merchantable white pine; the base moulding to continue around doors and windows.

Pantries and Closets.—Kitchen pantry to be fitted with shelves on two sides as shown. The bed room closets will be fitted with one shelf and wardrobe hooks underneath.

Cellar Door.—Put up outside cellar door as shown, of narrow beaded ceiling, put together with wrought nails, hung and locked complete.

Cutting.—Do all necessary cutting for plumber. Furnish and put up all necessary boards for plumber to screw his work to.

Hang Shelf.—Put up hang shelf in cellar where directed, of wide ceiling and good strong hangers, 2′ 6″ wide ×8′ long.

Privy.—Build privy 4′ 6″×4′ 6″ square, and 6′ 6″ high, to be built of sound pine boards. Roof to be covered with boards, door to be hung with 6″ T hinges and fastened with thumb latch. Put a button on inside to hold door when desired. Fit up with pine seats, with lids hinged over holes.

Back Stoop and Steps.—The inclosed back stoop shown on plan to be built of sound pine boards well nailed to a frame, composed of 2″×4″ wall strips planed, roof covered with tin. Steps to same are to be made of 1¼″ pine plank (planed).

The stoop and porch floors to be 1″ thick, 4½″ wide, laid in white lead and blind nailed. Steps to have 1¼″ treads and ⅞ risers. The roof to be ceiled and tinned. Columns, plates, ceiling, etc., to be white pine, worked and trimmed as per details. The piazza to be ceiled on the under side, part raked and part on level, with 3″ beaded ceiling ⅞ thick, beams 2″×4″.

Blinds.—All windows, except cellar, have 1¼ outside blinds, made, hung, and fastened in the best manner, painted at the factory three coats.

Exterior.—The water table, corner boards, cornice, window frames, porches, and all other exterior ornamental work to be made of good quality of white pine, in accordance with the drawings and details.

PAINTING.

Paint the entire house inside and out, including blinds and chimneys, two coats of good ready mixed paints of such colors as may be selected. All sap and knots to be shellacked before priming is done. Putty up all nail holes, etc., complete. Paint all tin work two coats of

Prince's metallic mineral paint. Also paint privy same as house.

MASON'S SPECIFICATIONS.

Excavations.—Proper excavations, of depth as shown on plans, or the cellar proper, to be about 4½′ deep. All piers and foundations 2′ 6″ deep. Stoop foundations 2′ 6″ deep. Earth and rubbish to be removed where directed. All water that may accumulate during the excavation, from any cause whatever, to be removed at once by the contractor, and the premises kept dry. Also excavate for privy. Size and depth as directed by owner.

Stonework.—The cellar walls to be of good sized stones, those generally used in the vicinity, 16″ thick, to the full height of cellar, which will be 7′ in the clear, and to be laid, as shown, in cement and lime mortar, with sharp sand. The stone laid binding, the outside where exposed to view to be pointed with cement mortar and cut joints. The inside to be pointed flush and smooth. All angles and corners to be perfectly plumb and the walls level on top.

Brick Piers, etc.—Build brick piers where shown on plans of good hard burnt Jersey brick, of dimensions indicated on plans. All piers outside to be excavated for at least 2′ 6″ deep, and filled in with small stone, and well hammered down to a solid bed.

Cellar Steps, etc.—Furnish and set bluestone sills to all cellar windows. Furnish and set bluestone steps where shown, with brick risers and stone cheeks and copings.

Chimney Flues, etc.—Build chimney as shown on plans, of good hard burnt brick. The joints of all flues struck smooth and capped with bluestone caps, 3″ thick, with holes cut in.

Plastering.—The entire house to be lathed and plastered. All to be regular two coat work and all skin finish, and all done in a good and workmanlike manner, using good materials. The mortar to lie at least one week before using. All the ceilings to be hard finished.

MASON'S ESTIMATE.

78 yards excavating, at 25 cts. per yd	$19 50
8,600 brick for foundation, at $15 per M, laid.	129 00
Cellar steps, complete	20 00
Chimney, complete	60 00
5 cellar window sills	4 00
Brick piers	20 00
300 yds. plastering, at 40 cts. per yd	120 00

CARPENTER'S ESTIMATE.

1	4″ ×8″×24′ =	64 feet.	
2	3″ ×8″×22′ =	88 "	
2	3″ ×8″×24′ =	96 "	
2	4″ ×4″×24′ =	64 "	
2	4″ ×4″×22′ =	59 "	
28	2″ ×8″×22′ =	821 "	
12	2″ ×8″×20′ =	324 "	
2	2″ ×8″×16′ =	42 "	
6	4″ ×4″×16′ =	126 "	
24	2″ ×5″×16′ =	320 "	
1	3″ ×6″×20′ =	30 "	
2	3″ ×6″×14′ =	42 "	
200	2″ ×4″×16′ =	2,067 "	
2	1¼″×6″×24′ =	30 " = 4,173 ft., at $14 per M.	$58 42
1,400 ft. narrow novelty siding, at $32 per M.			44 80
180 ft. 4½″ floor piazza and stoop floor, at $35 per M.			6 30
320 ft. wide ceiling inclosing back stoop, at $30 per M.			9 60
175 ft. piazza ceiling, at $35 per M.			6 12
Back and front steps ready to put up			8 00
Columns, lattice, brackets, etc., for piazza, ready to put up			22 00
Cornice, complete to put up, for back stoop and pantry			6 00
50 ft. water table, at 3 cts. per ft.			1 50
125 ft. main cornice, at 20 cts. per ft.			25 00
Brackets, etc., for cornices and gables			6 00
Corner boards and bands			4 00
Outside cellar door, complete			4 00
1,300 ft. floor, at $25 per M.			32 50
275 1×2 shingle lath, at 4½ cts			12 37
9,000 18″ pine shingles, at $4 50 per M.			40 50
5 cellar windows, complete			6 25
1 small window for pantry, complete			1 50
14 1st and 2d story windows, complete, $6.50 each			91 00
Front doors, complete, with frame and trimmings			15 00
Sliding door			10 00
11 doors, complete, $4.50 each			49 50
250 ft surbase, at 3 cts. per ft.			7 50
4 small shelves			3 00
Stairs, complete			40 00
Shelving closets.			5 00
Nails			15 00
Privy, complete			10 00
Labor for putting up work			200 00
Painting			80 00
Total			$1,193 06

SPECIFICATIONS, ESTIMATE, AND BILL OF MATERIALS FOR A SOUTHERN RESIDENCE OF MODERATE COST, SHOWN IN COLORED PLATE, SEPTEMBER, 1887.

The estimate on this house without cellar and without plumbing, furnace, etc., is $3,941.68; with cellar, plumbing, and furnace, $5,500.

GENERAL DESCRIPTION.

The building will be one story and breast work, with foundation under the whole house. First story 10′; second story 9′ and 8′ 6″ breast work. The first story will be hard finished on two coats brown mortar.

Foundation walls of brick 12″ thick. The frame will be of yellow pine, sheathed with yellow pine boards, and resin sized felting, sided with narrow bevel siding ⅝″ thick; shingled in the gables and sides where shown with cypress shingles, ornamental pattern. Cypress shingle roof.

Interior finish of yellow pine, finished off natural color of wood or stained; first floor laid with yellow pine and resin sized building paper.

CARPENTER WORK.

Frame.—The frame to be of sound yellow pine timber, of the following sizes; sills 3″ × 8″; posts 4″ × 8″; plates 4″ × 6″; ties and girts 4″ × 6″; those over bays to be 4″ × 8″; principal partition caps 4″ × 6″; others 4″ × 4″ and 3″ × 4″.

Beams.—Beams first story 2″ × 10″, 16″ on centers; second story 2″ × 10″, 16″ on centers. Headers and trimmers 4″ by depth of beams.

Rafters.—Rafters 2″ × 8″, 2′ on centers; collars to every pair of rafters 2″ × 6″.

Veranda.—Veranda rafters 2″ × 6″, 2′ on centers; sills and principals 4″ × 7″; beams 2″ × 7″, 2′ on centers; plates 3″ × 8″.

Hips, etc.—Hips, ridges, and valleys 3″ thick by depth of miters.

Braces.—Long braces 4″ × 4″; door and window studs 3″ × 4″ joist. All studs in principal bearing partition 3″ × 4″, other studs 2″ × 4″, all placed 16″ on centers.

Partitions.—All to be properly framed and braced, pinned and spiked, raised in position on foundation, true, level, and plumb.

Bridging.—Bridge all spans of beams of 10′ and over with 2″ × 3″ cross bridging, well spiked in place. Take care to have all studs stand directly over the ones below wherever practicable. Studs in bearing partitions to run through to girders or partition caps. Lap all beams over full width of bearings. Securely anchor all partitions at angles.

Windows.—All windows to be as indicated by the plans. Make and properly set.

Frames.—All other sash to have accessible pocket frames, with 2″ noiseless pulleys; 2″ timber sills; 1¼″ false sills; pulley and hanging stiles. Frames to have a quarter round placed in the sash grooves top and bottom, to stop the sash about 3″ from bottom and top.

Sash.—All sash to be of clear, seasoned yellow pine, lipped and moulded 1½″ thick, divided for glass as shown and to be double hung to iron balance weights, with best braided hemp sash cord. All to be fastened with bronze bell tip Ives sash locks.

Glass.—The glass for all windows will be filled with polished plate double thick French sheet glass for large lights and single thick for small ones. The front door will have rolled cathedral glass. Provide and hang complete. Inside Venetian cypress blinds of best make to all windows.

EXTERIOR FINISH.

Inclosing.—The exterior sides of frame, except the roofs, will be covered with thicknessed yellow pine box boards not more than 10″ wide, laid close and securely nailed to all bearings. Cover all the above sheathing boards with a good quality of tough resin sized sheathing paper, lapping each course at least 2″; placed under all outside casings and corner boards.

Siding.—Cover exterior walls where indicated from water table upward to shingle line with clear bevel siding free from knots, shakes and sap, to lie not more than 4″ to the weather. Said siding to be resawn from 1¼″ plank; secured on in most thorough manner with galvanized iron clapboard nails, with all joints carefully made and cut against all corner boards and hanging stiles.

Shingles.—In the gables and sides lay cypress shingles of ornamental patterns, all as indicated.

Water Tables, etc.—Form all water tables, outside casings, belt courses, and cornices as indicated, for which working drawings are furnished to exactly accord with scale drawings. Corner and angle boards will be 1¼″ thick; water table ⅞″ with 2″ cap moulding. Neat window caps as shown.

Roofs.—All roofs to be covered with best cypress shingles, laid three thick on 1¼″ × 2″ yellow pine shingle lath. Shingle lath to be strongly spiked to each rafter and the shingles carefully and well nailed on; joints broken to ⅓ width of shingles.

Gutters.—Form gutters in main roof cornices in best manner with I X charcoal tin, previously painted both sides before laying with Prince's metallic paint. The form for said gutter to be carefully laid to insure a good run for water to the several outlets, and to drain dry; outlets fitted with strong metallic strainers.

Flashing.—Do all necessary flashing around chimneys and wherever required to make a complete job, and line all valleys in best manner with I X charcoal tin, previously painted both sides before laying with Prince's metallic paint.

Leaders.—Put up where indicated from gutters galvanized iron leaders 3″ and 4″ in diameter, as required, with expansion tops.

Veranda.—Build the verandas and balconies as shown.

Floors.—Floors to be laid with clear 1⅛″ × 4½″ tongued and grooved yellow pine flooring, joints leaded and blind nailed. The outer edges of flooring to be rounded and to have cove and fascia.

Columns.—Turned columns to be 8″×8″, made of yellow pine (clear). Moulded rails 4″×5″ for upper and 3½″×4″ for lower. Balusters 3″×3″, square and turned. Cornices moulded, which is drawn to ¾″ scale as shown on details. Ceil overhead with yellow pine ceiling ⅞″×2½″, blind nailed. Mould around the angles with a neat moulding 2″×2″. Support the verandas on 12″×12″ brick piers.

Lay the roofs of best cypress shingles as required for main roofs; put on in best manner. Form deep gutters in veranda, inclining to the outlet, each to empty through 3″ galvanized iron expansion top leader on the ground. Gutter outlets to have strong metallic strainers, as provided for main roofs.

INTERIOR WORK.

Before laying any floors, carefully test and bring to a perfect level all beams, especially under sliding doors.

Floors.—Lay the entire first and second floors with thicknessed yellow pine plank not more than 5″ wide, laid horizontal and firmly nailed to all bearings.

Trimming.—The casings for all doors, windows, and other openings in first story will be made of perfectly clear and seasoned yellow pine, moulded to design ⅞″ × 6½″, cut against corner and base blocks at angles as required. The corner blocks will be turned to a neat design, and the base blocks will remain plain. The casings will extend to the floor for windows as well as doors, with panel backs under each window. Base for all the principal rooms and hall ⅞″×8″, including the shoe and top moulding, to match the casing. The base moulding will continue up and over the casings. Closet base 5″ wide, casings 3½″. Put down yellow pine saddles to all the doors of suitable widths; rubber stops to be placed behind all doors requiring them. The trimmings in pantry and back hall to be plain 5″ wide, 6″ base, with wall moulding.

Bath Room.—Fit up the bath room in a neat and workmanlike manner, of dry and clear materials as required. Ceil the sides with ½″×2½″ yellow pine to a height of 4′ 0″ and cap with neat mouldings, the floors being laid with yellow pine as before required.

Drain Board.—Fit on drain board for sink.

Doors.—All doors to be of the size and design required by the plans, made of clear seasoned yellow pine well framed, paneled and moulded All the single doors will have five panels in each, while the large folding doors and the double doors will be made to match with raised panels and neat flush moulding. The front doors as shown with the fan light glazed with plain glass. Doors to have raised panels and neat flush moulding. The jambs will be 1″ thick throughout, with neatly moulded stop of a width to form rabbet. Provide and put up rough jambs to all openings for mason to plaster to, only setting the jambs when all the walls are dry.

Pantry.—Fit up pantry in thorough manner, of select shelving hand smoothed. The counter shelf will be 20″ wide; all others 12″. Place the shelving at suitable distances, one above the other, to the height of door casing, where run a continuous shelf all around the upper part.

Closets.—Fit up all other closets in the usual manner, putting clothes hook strips neatly moulded, and hook with Goodwin clothes hooks in the minor rooms and ornamental bronzed iron hooks of approved pattern for the principal rooms.

Hardware.—The principal part of first story to have 4½″ brass face mortise locks, closet doors reverse bevel rim, jet and bronze knobs, lacquered butts, front doors 6″ mortise lock night latch attachments. Second story to have nickel plated and white porcelain furniture and plain cast butts. All windows to have bronze sash locks All hanging closets to be furnished with double wardrobe hooks. Furnish and set all necessary closet catches, buttons, etc., complete.

Vents.—Cover all vent holes in foundation walls with ¼″ mesh galvanized iron wire, well tacked to frames set in the brick walls.

Mantels and Grates.—The owner will furnish all mantels and grates. Take from catalogues of the manufacturers, but the contractor will furnish all necessary materials for setting same.

MASON WORK.

The contractor will stake out position of building as

directed, with all necessary stakes indicating the outlines of building, taking care to secure correct lengths, widths, and true angles.

Excavation.—Do all necessary excavating for trenches to walls, piers, chimneys, and for all other work requiring it, at least 2′ 6″ deep. Deposit the soil in a separate heap. Grade the surplus earth around the building and grounds under the direction of the owner.

Trench Walls.—Make the trenches 6″ wider on each side than the walls.

Brick Walls.—Build all the walls from bottom of trench to 3′ 6″ above the natural grade, of good hard burnt brick, laid in course headers every seventh course. These walls started on solid concrete footing; this also applied for all piers and chimney foundations. Chimneys and piers built of same quality of brick as foundations, the best selected for chimneys where exposed to view. The whole outside of these brick walls to be cemented from bottom to top with strong Rosendale cement to prevent the water from coming through.

Chimneys.—Build upon solid concrete footings the chimney stacks, as shown, with flues as indicated, to be built up perfectly solid and true, with joints thoroughly filled. Joints struck and pointed up outside and in. Plaster tightly around all openings. Make all necessary provision for grates. Chimneys at least 1″ in clear of all framework. Cap with 3″ bluestone caps with holes cut in.

Mortar.—All brickwork to be laid up in mortar composed of lime 1 part, and clear, sharp sand mixed in proportion, with ⅛ cement added to the time of using.

Bluestone.—Place flagging the length of steps before the steps leading from all veranda entrances 3″ thick 4′ wide.

Fireplaces.—Lay the hearths with ornamental tiles bedded in cement, joints filled in.

Arches.—Turn arches to all fireplaces on iron chimney bars, and trimmer arches under the hearths.

Plastering, Filling-in.—Fill in above all sills, ties, and girts; partition caps 8″ high, with brick and mortar to prevent mice from passing up walls or partitions.

Lath.—Lath with best spuce lath all walls, partitions, and stairways, ceiling, and closets, of the first and second stories. Laths set thickness of a lath apart. Not more than eight laths to a break on ceilings and twelve on sides, securely nailed to all bearings.

Plaster.—All the above lathing to be plastered with a scratch coat, brown coat, and hard finish. Plastering to go down to floor in all cases, and to be worked close to all grounds.

Cornices.—Run neat cornices in parlors, hall, dining room and other principal rooms, first story and second story hall.

Mortar.—Plaster to be composed of first finishing lime and clean, sharp sand, with a plentiful mixture of fresh long goats' hair. All the work to be true and plumb and rendered hard by troweling, care being taken to avoid spots and blisters and other defects.

Center Pieces.—Center pieces in all the principal rooms, first story and second story hall. Average cost, $2.50 each, exclusive of setting. Selected by owner. Plasterer to patch up and repair after artisans and leave all perfect. This contract does not include cellar.

Painting.—All the exterior woodwork usually painted to be painted two good coats of best Atlantic white lead and linseed oil paint. All knots and sap to be well shellacked before priming. All cracks, joints, and nail holes, and over nail heads to be well puttied after priming is done. All tin work to have two coats of Prince's metallic paint Also paint the chimneys two coats. All the colors to be selected by the owner. The interior will be wood filled with Wheeler wood filler, then two good coats of hard oil finish. The first and second stories, and main stairs and balusters and rails will be rubbed down to a smooth surface. All the doors, saddles, hearth borders, will be oiled. All sash and outside doors must be painted on top and bottom. The painting must follow immediately after the carpenters.

ESTIMATE FOR MATERIALS.

2	pieces	3″× 8″×23′=	92 feet.
4	"	3″× 8″×32′=	256 "
1	"	3″× 8″×25′=	50 "
1	"	3″× 8″×16′=	32 "
1	"	3″× 8″×20′=	40 "
1	"	3″× 8″×18′=	36 "
1	"	3″× 8″×24′=	48 "
3	"	3″× 8″×22′=	132 "
1	"	3″× 8″×26′=	52 "
4	"	3″× 8″×12′=	96 "
41	"	2″×10″×17′=1,148	"
6	"	2″×10″×23′=	234 "
50	"	2″×10″×16′=1,333	"
44	"	2″×10″×13′=	953 "
20	"	2″×10″×20′=	680 "
16	"	2″×10″×25′=	661 "
13	"	2″×10″×12′=	260 "
34	"	2″×10″×32′=1,836	"
7	"	2″×10″×18′=	210 "
3	pieces	2″×10″×12′=	60 feet.
1	"	4″×10″×22′=	73 "
2	"	4″×10″×16′=	126 "
4	"	4″×10″×12′=	160 "
2	"	4″× 6″×22′=	88 "
8	"	4″× 6″×21′=	336 "
2	"	4″× 6″×28′=	112 "
2	"	4″× 6″×20′=	80 "
2	"	4″× 6″×14′=	56 "
20	"	4″× 6″×16′=	640 "
1	"	4″× 6″×17′=	34 "
1	"	4″× 6″×13′=	26 "
1	"	4″× 6″×30′=	60 "
2	"	4″× 6″×18′=	72 "
1	"	4″× 6″×25′=	50 "
1	"	3″× 8″×30′=	60 "
1	"	3″× 8″×14′=	28 "
1	"	3″× 8″×18′=	36 "
1	"	3″× 8″×28′=	56 "
14	"	2″× 8″×21′=	392 "
47	"	2″× 8″×16′=1,002	"
27	"	2″× 8″×26′=	936 "
24	"	2″× 8″×20′=	648 "
1	"	2″× 8″×30′=	40 "
1	"	2″× 8″×24′=	32 "
2	"	2″× 8″×25′=	65 "
5	"	2″× 8″×14′=	93 "
5	"	2″× 8″×13′=	87 "
2	"	4″× 8″×22′=	117 "
800	"	3″× 4″×12′=9,600	"
			23,314 "

23,314 feet timber, yellow pine, at $20 per M...	$466 28
1,600 " weather boards, at $30 per M.....	48 00
5,000 6×18 cypress shingles, at $10 per M.....	50 00
340 feet verges and cornice, milled out, at 28 cts. per ft	95 20
400 " small cornices, at 20 cts. per ft.....	80 00
15,000 6×24 cypress shingles, at $12 per M.....	180 00
1,000 1×2 shingle lath and furring, at 4 cents each.....	40 00
6 8×8 turned columns, at $2.25 each.....	13 50
5 8×8 short turned heads, at $1.50 each....	7 50
1 square column.....	1 50
80 feet piazza rail, worked, at 20 cts. per ft..	16 00
20 " of rail for back piazza, at 15 cts. per ft	3 00
22 " balcony rail, at 20 cts. per ft.....	4 40
112 3×3 turned balusters, at 20 cts each.....	22 40
6 filling circles for piazza and balcony.....	15 00
All gable filling.....	12 00
220 feet water table, fascia, etc., at 7 cents per ft.	15 40
1,000 " piazza ceiling, at 3 cts per ft.....	30 00
1,000 " piazza floor, at 4 cts. per ft.....	40 00
Front stoop, ready to put up.....	8 00
Back stoop, ready to put up.....	5 00
600 lineal feet 1¼×6 strips, at 4 cts. per ft....	24 00
450 square feet tin, at 7 cts. per sq. ft.....	31 50
125 feet tin leader, at 12 cts. per ft.....	15 00
4 brackets for back piazza, at 50 cts. each..	2 00
4,500 feet floor inside, at 3 cts. per ft.....	135 00
27 first story window frames, blinds and sash and trimmings complete, at $8.50 each..	229 50
20 second story window frames, blinds and sash and trimmings complete, at $8 each	160 00
4 frames and sash for loft, at $12 each.....	48 00
16 first story doors and trimmings complete, at $7 each.....	112 00
9 second story doors and trimmings complete, at $6.50 each	58 50
2 stairs put up complete.....	150 00
450 feet surbase, at 4 cts. per ft.....	18 00
Prepared material for fitting bath room..	12 00
Prepared material for 6 closets and pantry.....	18 00
Labor in putting up work.....	800 00
Nails and incidentals.....	75 00
	$3,041 68
Painting work.....	200 00
Mason work.....	700 00
	$3,941 68

Use of Gas Tar.

I have noticed in "Notes and Queries," occasionally, inquiries as to how to thin gas tar so as to use it as paint, and I have been surprised that spirits of turpentine and gasoline should be recommended. I have never been able to mix turpentine and gas tar (from Philadelphia gas works), and gasoline I consider dangerous, and so volatile that it needs to be added frequently or the tar gets too thick.

For over twenty-five years I have used gas tar for painting tin roofs, and the best thing for thinning tar is oil, and where it can be had I prefer resin oil, which can be procured in any city. It is cheap and as durable as the tar, which animal and linseed oil are not, but the kind of oil makes no difference excepting for the cost. Tin is not injured by it.

Chas. R. Webb.

Philadelphia, Aug., 1887.

Gardens at Railway Stations.

There are few more encouraging signs of progress in horticulture than the spirited way in which the growth of beautiful flowers for embellishing railway stations is being taken up by many of the employes of the railway companies. Country stations are generally dull and dreary; therefore an object like the one under notice should receive the highest encouragement, and that for many reasons. I was never so impressed as when, a short time ago, having to wait some time for a train, I walked up and down the platform, admiring and inhaling the sweet perfume of roses, pansies, and pinks.

In the midst of these flowers there came to mind recollections of stone gardening so common at some stations—broken red bricks, whitewashed flints, and other incongruities, arranged where, if nothing better could be provided, green turf would be preferable.

At the present time a pretty line, from beginning to end, is the branch running from East Grinstead to Brighton. The high level of East Grinstead Station does not permit of much being done, but one can catch a glimpse of the station master's garden, which adjoins. It is neat and simple, the useful as well as the ornamental being visible in the shape of good crops of vegetables and plenty of roses and pansies. The railway slopes round the station buildings are furnished with shrubs and flowers, a most pleasing contrast to the dreary waste of refuse generally seen.

On the low level large rose bushes are to be seen on the walls. Gloire de Dijon had over 100 flowers expanded at one time. Reluctantly we leave this and go on to the next station, Kingscote The traveler little expects the vision of beauty awaiting his arrival. This station can claim to be one of the best anywhere to be found. The company gives prizes for the prettiest stations on their lines, and last year Kingscote took first; but, not content to rest upon his well-earned laurels, Mr. Ward, the station master, has again produced a display difficult to equal, much more to beat. He possesses a little glass house, erected at his own cost, and tended during his spare time. In this house are wintered many of the plants that now help to make such a gorgeous display.

Beneath the covered portion of the platform, on both sides of the door, are two large groups, 1,200 pot plants being used in the arrangement. Pelargoniums were in profusion, noticeable being Henri Jacoby, the color even more effective in the subdued light. Ivy leaved pelargoniums suspended from the roof were very nice; also the fuchsias, among which were good, well-flowered specimens of the fine old F. fulgens. Old tree roots made excellent receptacles for hardy ferns and stonecrop.

The little borders along the back of the open part of the platforms were perfect pictures, produced, not by elaborate bedding out, but by the culture of good old fashioned flowers. Pansies had been one mass of flower, and the plants, though apparently somewhat exhausted, will soon be reinvigorated by the rich top dressing that has been given them. Pinks, especially Mrs. Sinkins, were strong, healthy, and full of flower. Pinks are worth growing if only for the nice color of their foliage, which is much prettier than some of the sickly variegations sometimes met with. Behind the borders is a little wooden fence, which will soon be draped with roses. There are many fine blooms, and two bushes of the old moss rose had individual flowers larger than we have ever seen in gardens.

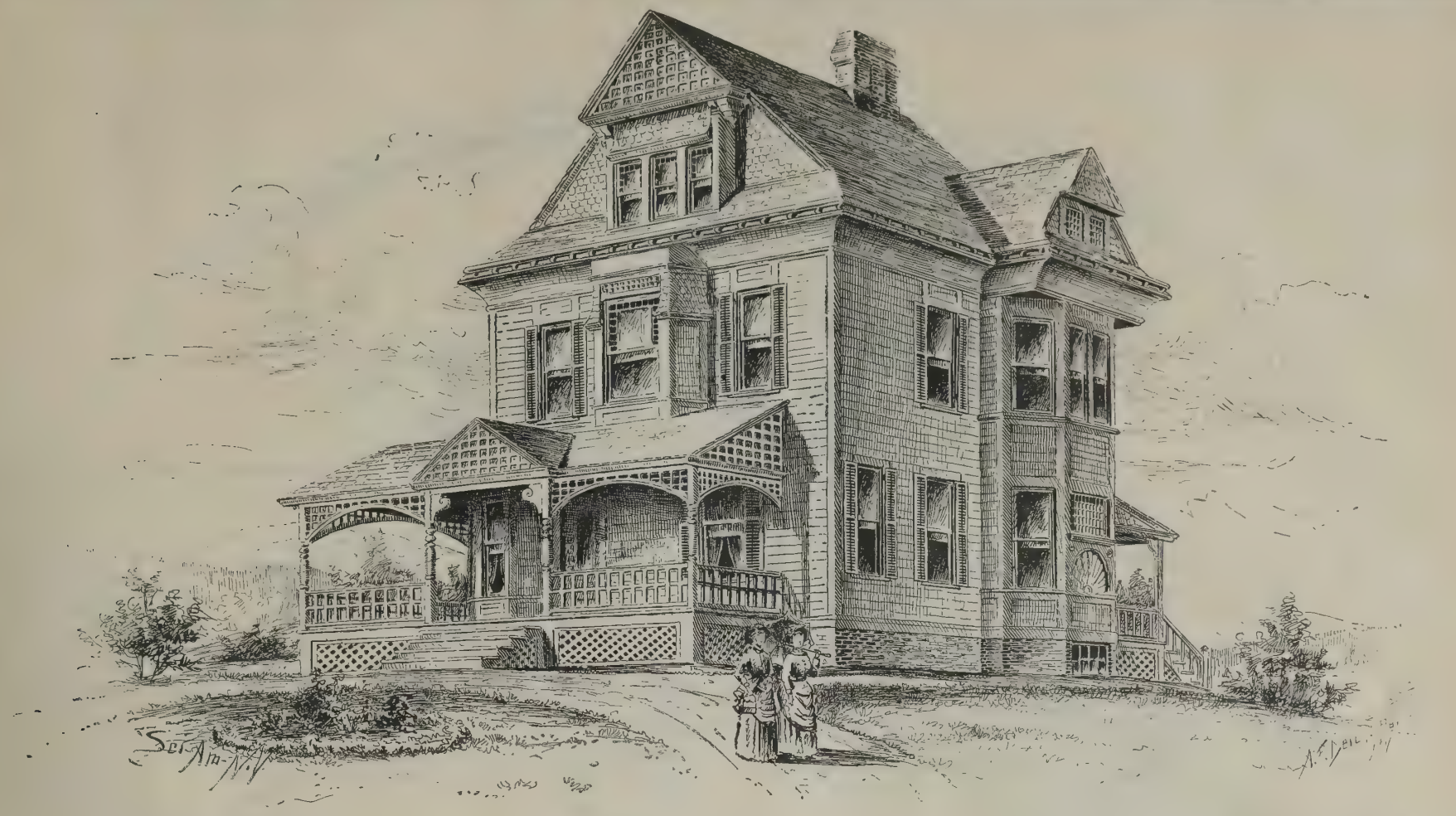
Those who use this station must feel they owe a debt of gratitude to a man who voluntarily provides them with such a treat, and that at no small expense to himself. At the next station, West Hoathley, all was blank. True, there was a small glass house at the back, but the occupants appeared dead. We hope the station master may become imbued with some of the enthusiasm so conspicuous among his fellow workers.

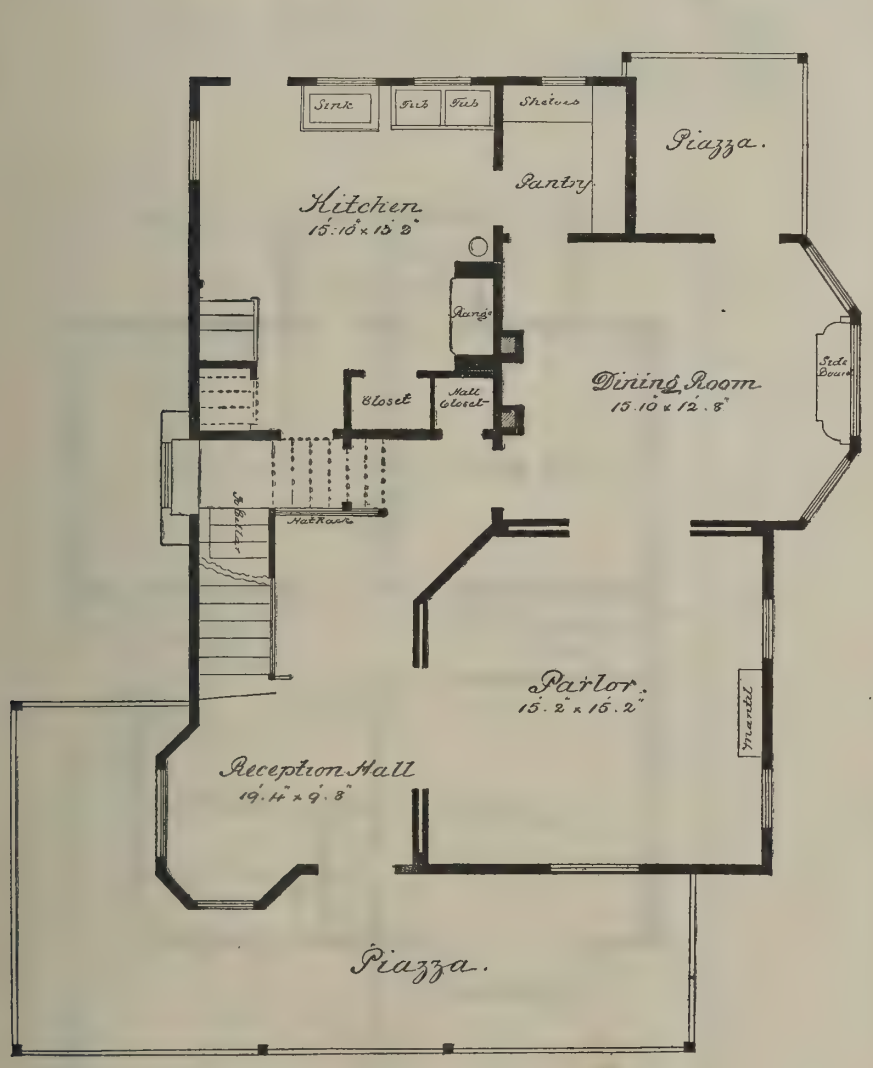
At Horstead Keynes we were again in the land of plenty. Roses, pinks, and pansies were at their best. Here and all along the remainder of the line a mistake has been made by planting laurel and privet to form a hedge in front of the fence, which will ultimately preclude the possibility of growing flowers. A little forethought, and this might have been avoided.

Sheffield Park was brightened by roses, pinks, antirrhinums, and sweet Williams. At Newick and Chailey, roses were very good, while beneath the covered way a small rockery had been constructed from the natural sandstone of the district and planted with hardy ferns and London pride, which looked nice and fresh.

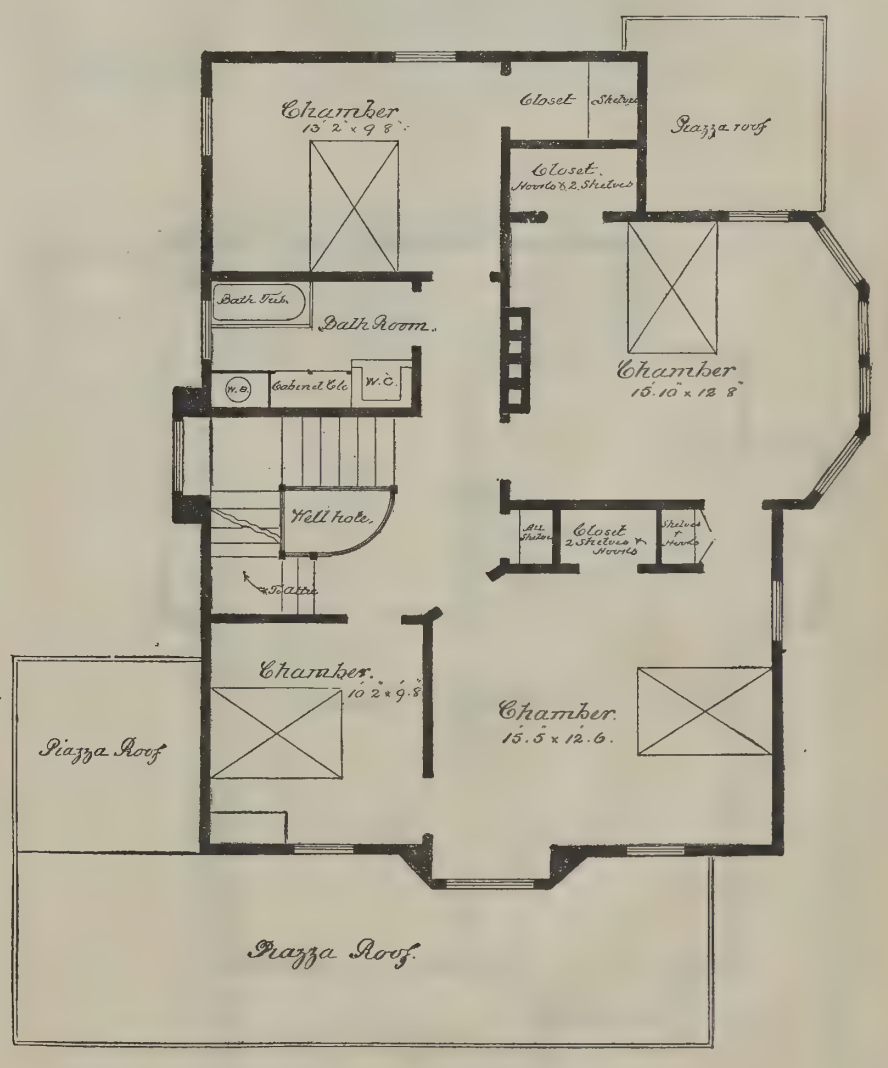
As one gets nearer Brighton, Flora seems to have been less profuse in her gifts, but about Lewes Station there are plenty of trees, and between there and Falmer were banks literally draped with ivy and having a beautiful effect. Other banks were clothed with St. John's wort.

London Road, which is really a part of Brighton, had a large bed of Canterbury bells in full summer beauty, but, utterly regardless, the train steamed away into the seaside metropolis, and ended the pleasantest and prettiest journey ever made by rail.—*A. Herrington, the Garden.*





PLAN OF FIRST STORY.



PLAN OF SECOND STORY.

A $5,000 DWELLING.

A $5,000 DWELLING.

This house has a front 28 ft. over all; side 38 ft. over all. The floor plans show the size of rooms.

Height of stories (measured in the clear): Cellar, 7 ft.; first story, 9 ft. 6 in.; second story, 9 ft.; attic, 8 ft.

Materials.—Foundation, 18 inch stone wall; first and second stories clapboarded with 5 in. clapboards; roof black slate.

Cost.—This house has been built near this city, complete with all the modern improvements, furnace excepted, for $5,000. If the attic is not furnished, simply floored, it would make a saving of about $150.

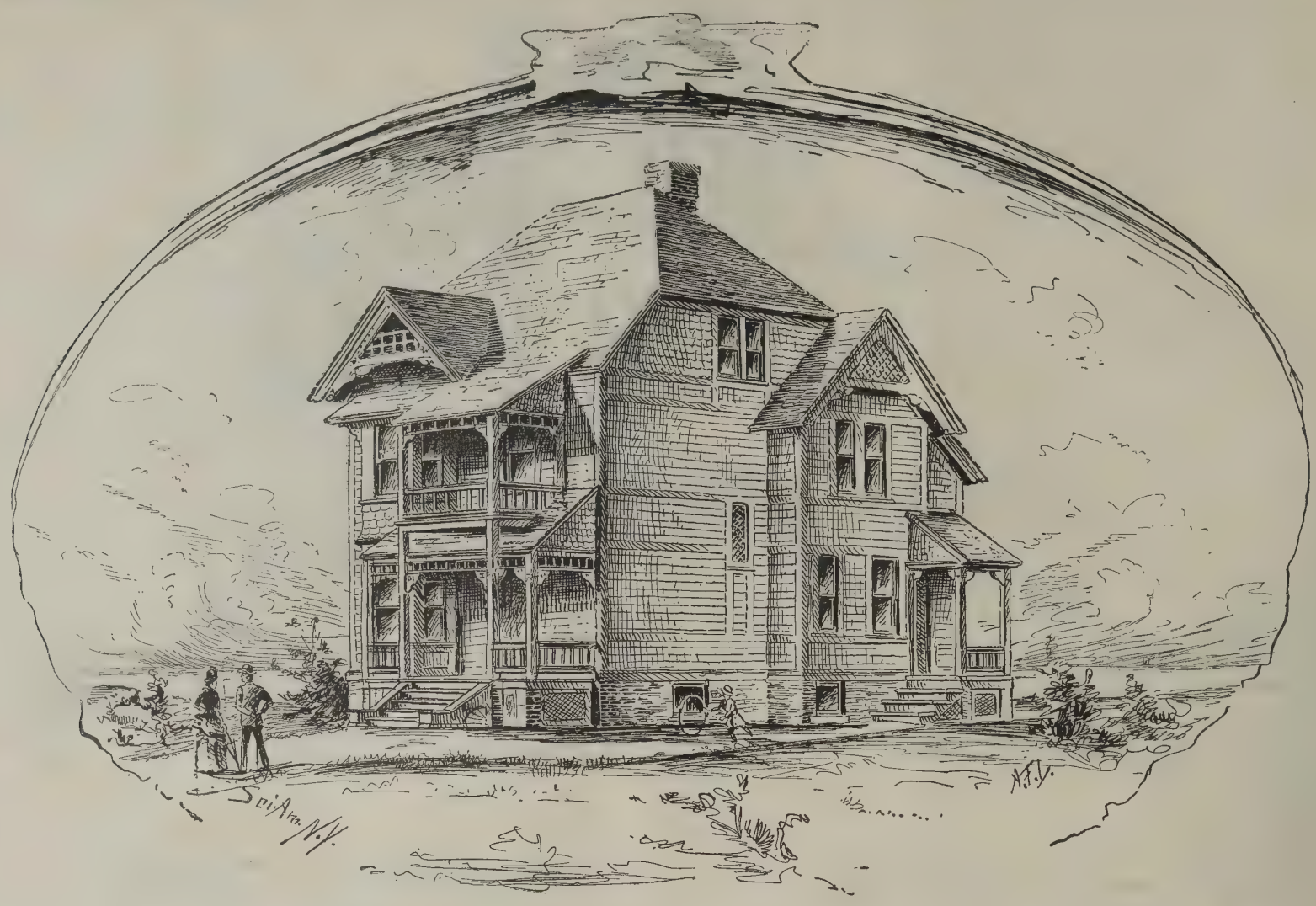
There is a cellar under the whole house, with cemented bottom. Double folding doors connect the parlor, dining room, and hall. A back stairway leads from kitchen to platform of main stairs. The position of the stairway affords convenient access from kitchen to second story.

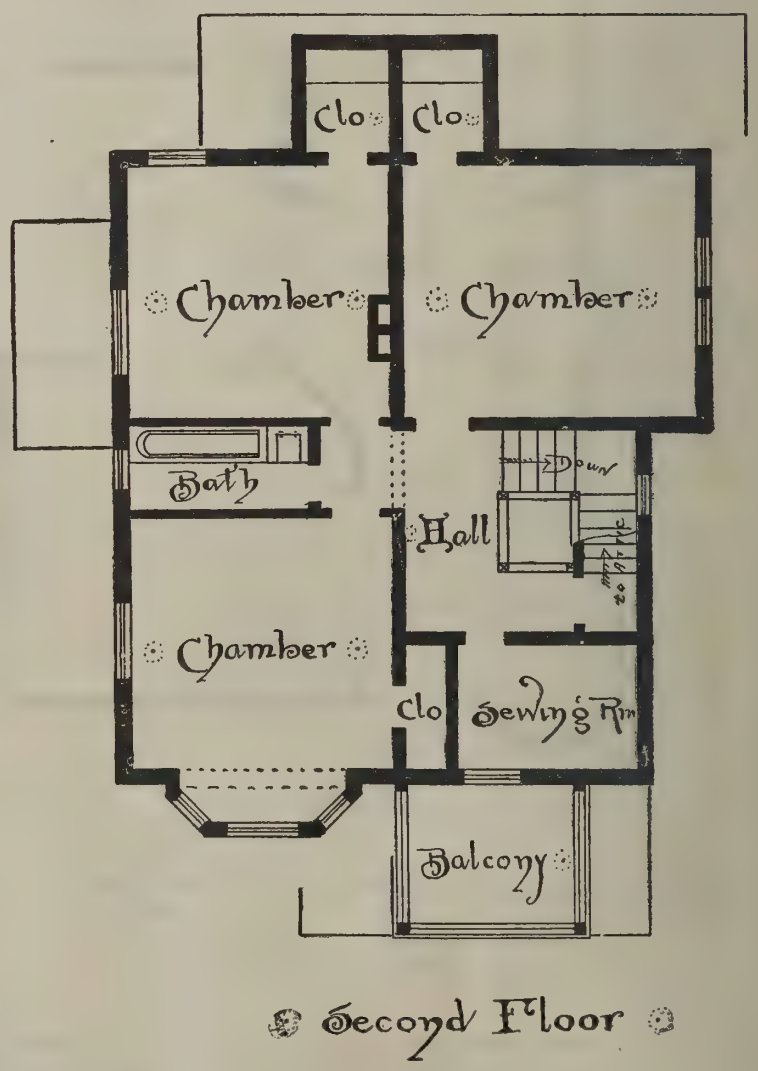
Further information can be had by addressing Munn & Co., architects, at this office.

Removal of a Dividing Wall.

A new method for supporting walls has been inaugurated by Architect Frederick Baumann, of Chicago. It became necessary to take out the first story of a dividing wall in a double store building, supporting the wall with iron beams, the ends resting on iron columns. Instead of using screw and needles, as is usual in such cases, the architect conceived the idea of removing the wall from the line of the ceiling to a little below the floor line, for a distance of 126 ft., in nine equal spans, and inserting the columns without any temporary support.

This was done by first cutting through the wall where the column was to be set; then a firm foundation was secured through placing a curved cast iron bearing plate in the wall below. Upon this were placed two footing plates, with steel wedges between. The column was then placed on the footing plates, and a stone cap placed upon the column, and the space between this and the wall above filled with brick set in Portland cement. After allowing this to stand for a day, the steel wedges were driven up until the column formed a substantial support. After all the columns were set in this way, the iron I beams upon which the wall was to rest were introduced. This was done by cutting half through the wall on one side, placing the beams, and then placing those on the opposite side in the same manner. The work was perfectly successful, and no settlement of any kind occurred, though each column supports a weight of over 110 tons. It was observed, however, that the utmost care and the constant watchfulness of the architect were necessary, as the entire operation was a delicate one from an engineering standpoint, the slightest neglect or mistake, especially in keying, being liable to lead to serious results. Mr. Baumann's method will doubtless be followed generally where the same work is to be accomplished, namely, the substitution of the columns for the lower part of a dividing or outside wall. From this demonstration it would seem that the plan may be adopted for buildings of almost any height, at a great saving in time and cost.—*Inland Architect.*





A THIRTY-FIVE HUNDRED DOLLAR COTTAGE.

A $3,500 COTTAGE.

The accompanying sketch represents a small but conveniently arranged frame cottage of seven rooms, designed by Geo. H. Blanden, architect, Springfield, Mass.

There are three rooms on the first floor, three on the second, one bed room in the attic, also a room in the attic for storage.

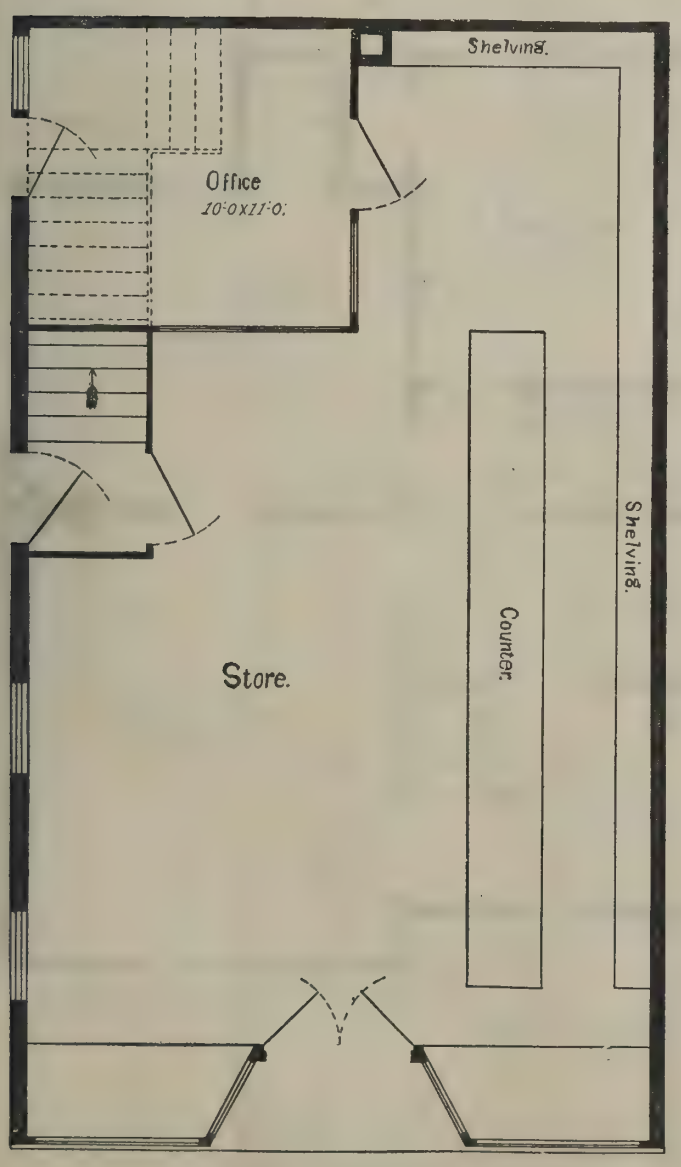
The foundation is of brick, nine inches thick, with an air space. The exterior walls are of frame, 2×4 inch studding, covered with hemlock boards, paper, and with exterior finish of extra spruce clapboards and bands of cut shingles.

The interior finish is mill-worked white pine, painted, except the stair case, which will be ash finished in oil.

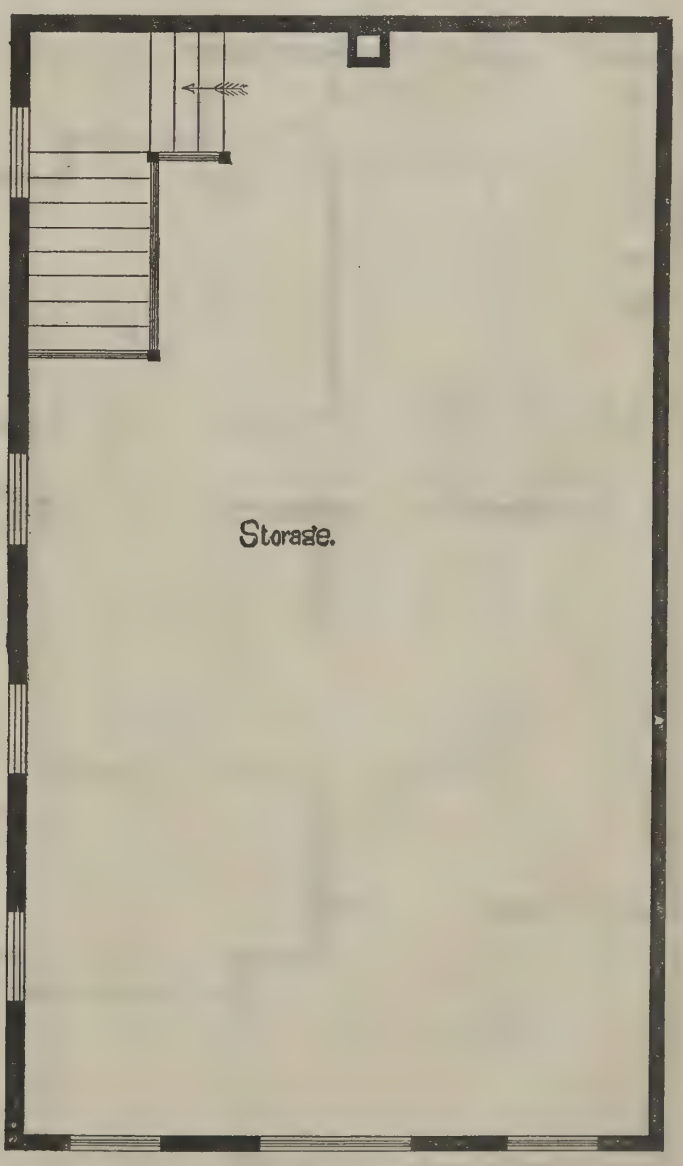
The cottage will cost $3,500.

Plate Glass.

The history of the business of insuring plate glass against breakage furnishes some curious statistics, as well as a good deal of information of value to architects and builders. It seems, from the Boston *Transcript*, that notwithstanding the insignificant appearance of its business streets in comparison with those of New York or Chicago, Boston possesses more plate glass, in proportion to its population, than any other city in the country, and the insurance companies find much employment there. At present, most of the insurance on glass is done by two companies, the Lloyd's Plate Glass Insurance Company and the Metropolitan Plate Glass Insurance Company, both of New York. The premium is a small percentage on the value of the glass —about two or two and one-half, we believe —and three-quarters of all the plates in Boston are said to be covered. It is estimated that there is one break a year in every eight windows insured, so that the premium does not seem unreasonably high. Losses are settled by the replacing of the glass, instead of a payment of money, and disputes are thus avoided, while the owner of the building and his tenants are spared the trouble of attending to the matter for themselves. In Boston, about one plate a day represents the loss to the companies, and the breakages occur from an almost infinite variety of causes. The usual cause is, naturally, stone throwing of boys or men in the streets; and out of one thousand breakages, about three hundred are due to this. According to the statistics of the Lloyd's company for 1885, the most active glass breakers, next to stone throwing boys, are burglars, who broke in that year about ten per cent. of all the sheets in Boston which the company had to pay for. Pistol shots produce



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.

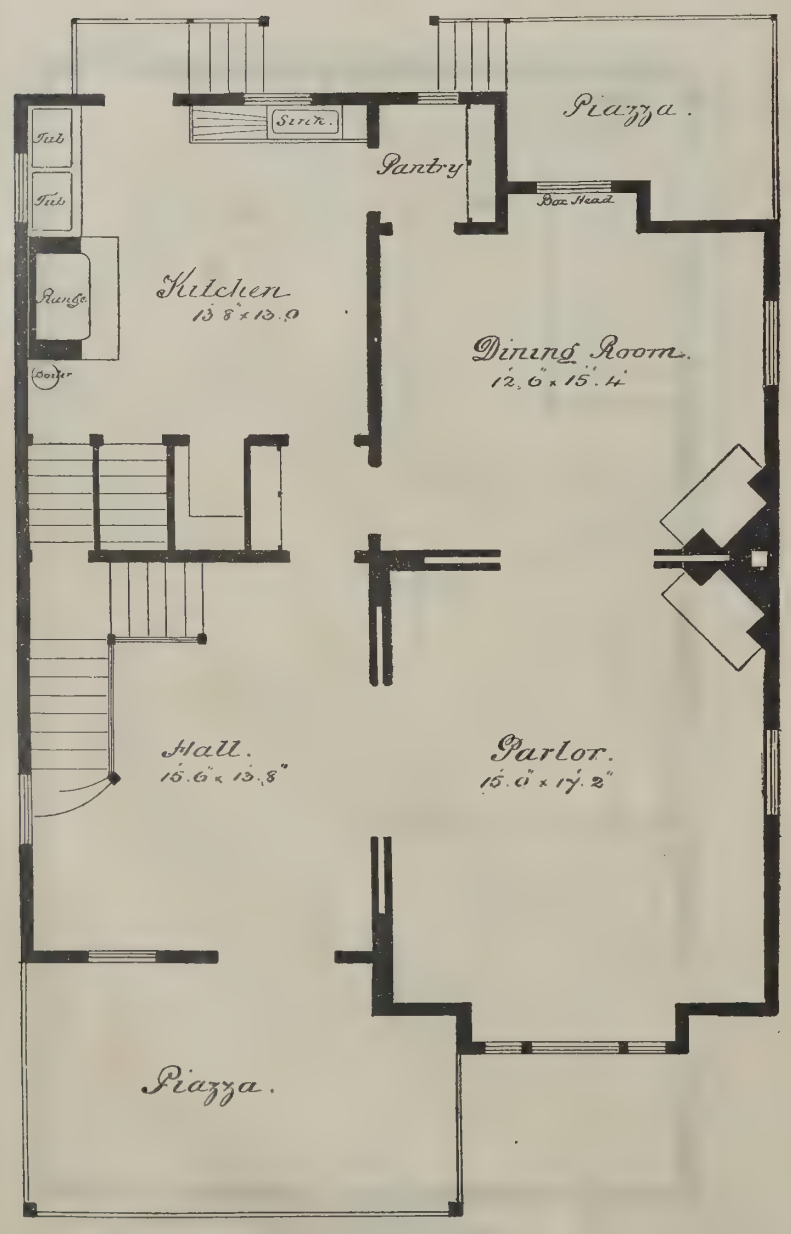
A COUNTRY STORE COSTING $2,000.

many breakages, and, even in quiet Boston, about one plate is broken by a bullet for every four broken by stones. Next to missiles of various sorts, the wind is the greatest enemy of plate glass, many lights being blown in by tempests, while many more are broken by the slamming of doors and blinds. Much less pains is taken to protect large lights in Boston than in New York, rolling shutters, so common in New York, being rare in Boston but the premium rates are the same in both places, and perhaps the miscellaneous causes of destruction, which are accountable for thirteen per cent. of the breakages, are more active in New York One of the heaviest losses of the kind that we remember occurred in the latter city some years ago, where a large number of plates of different sizes, intended, we believe, for the front windows of the first story of a hotel, had been taken out of their boxes, and were placed against the wall of one of the rooms, ready for setting. The glaziers were at work, and one of them, looking for the particular light which he wanted next, found it in the interior of the stack, close to the wall. He tried to pull it out sideways, and in doing so tipped the rest of the plates forward. The whole mass fell to the floor with a crash, breaking every plate, and causing a loss of about five thousand dollars.—*Amer. Architect.*

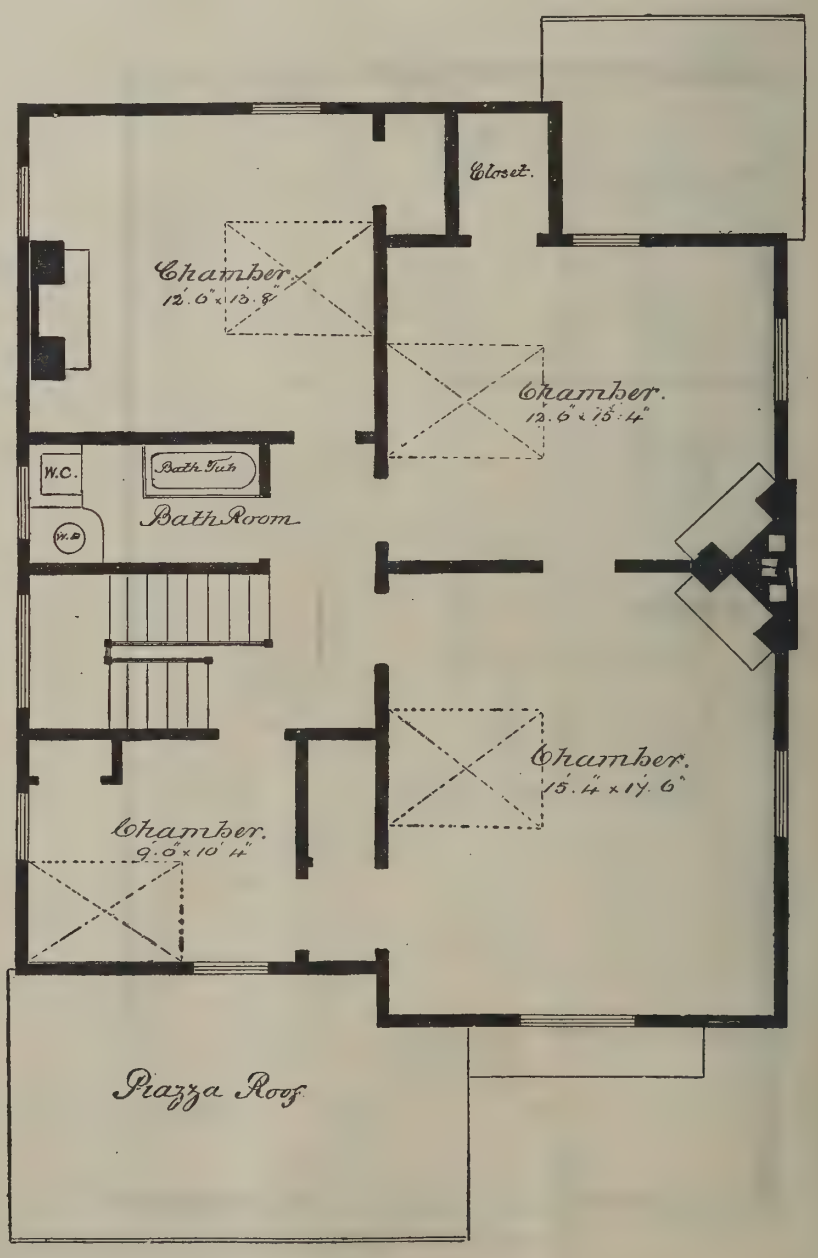
A COUNTRY STORE COSTING $2,000.

This building has front 22 ft. over all. Width of side over all, 38 ft. Height of stories (measured in the clear) is: First story, 10 ft. 6 in.; second story, 9 ft. 6 in.

Materials.—Foundation, 12 inch brick wall; first and second stories, clapboards; gables, shingles; roof, black slate. Has lately been erected near this city at a cost of $2,000, complete, without store fittings. Further information may be had at this office.



First Floor Plan.



Second Floor Plan.

A RESIDENCE COSTING $4,000.

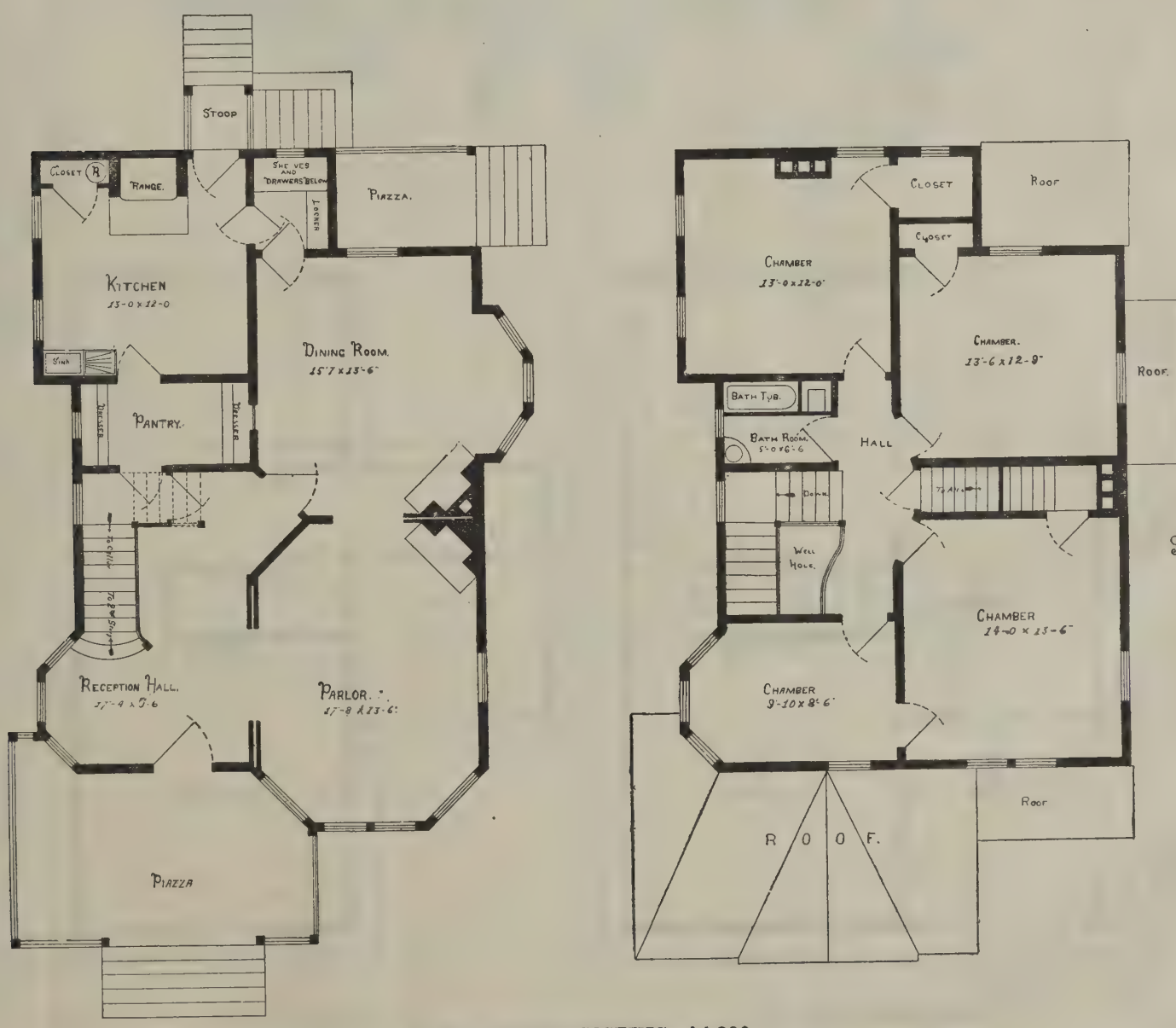
A RESIDENCE COSTING $4,000.

We give a perspective and floor plans. The building has a front of 30 ft. Side over all, 36 ft. The floor plans show the sizes of the rooms. The height of stories (measured in the clear) is as follows: Cellar, 7 ft.; first story, 9 ft. 6 in.; second story, 9 ft.; attic, 8 ft.

Materials.—Foundation, 18 inch stone wall; first story, clapboards; second story, shingles; roof, black slate.

Cost.—Complete, all modern improvements included, except furnace, $4,000. If the attic is not finished, simply floored, there would be a saving of about $150. The cellar extends under the whole house, with cemented bottom. Double folding doors connect the parlor, dining room, and hall. A back stairway leads from kitchen to platform of main stairs. The position of the stairway affords convenient access from kitchen to second story

Further information can be had by addressing Munn & Co., architects, 361 Broadway, New York. Plans, details, specifications, etc., for any of the buildings illustrated in this work may be obtained on very moderate terms, as above.



First Floor Plan.

Second Floor Plan.

A DWELLING COSTING $4,200.

A DWELLING COSTING $4,200.

We give a perspective of a house now nearly completed, near New York. It has a front of 24 ft., width over all 29 ft. 6 in., side not including veranda 40 ft. The floor plans give the sizes of rooms.

Height of stories (measured in the clear): Cellar, 7 ft.; first story, 9 ft. 6 in.; second story, 9 ft.; attic, 8 ft.

Materials.—Foundation, 16 inch stone wall; first story, clapboards; second story, clapboards; roof, black slate.

Cost.—$4,200, complete, except heater and range.

Special Features.—Cellar under the whole house, with cemented bottom. Double folding doors connect the parlor, dining room, and hall.

If the attic is left unfinished, simply floored, there will be a saving of about $150.

Removing Grease from Boilers.

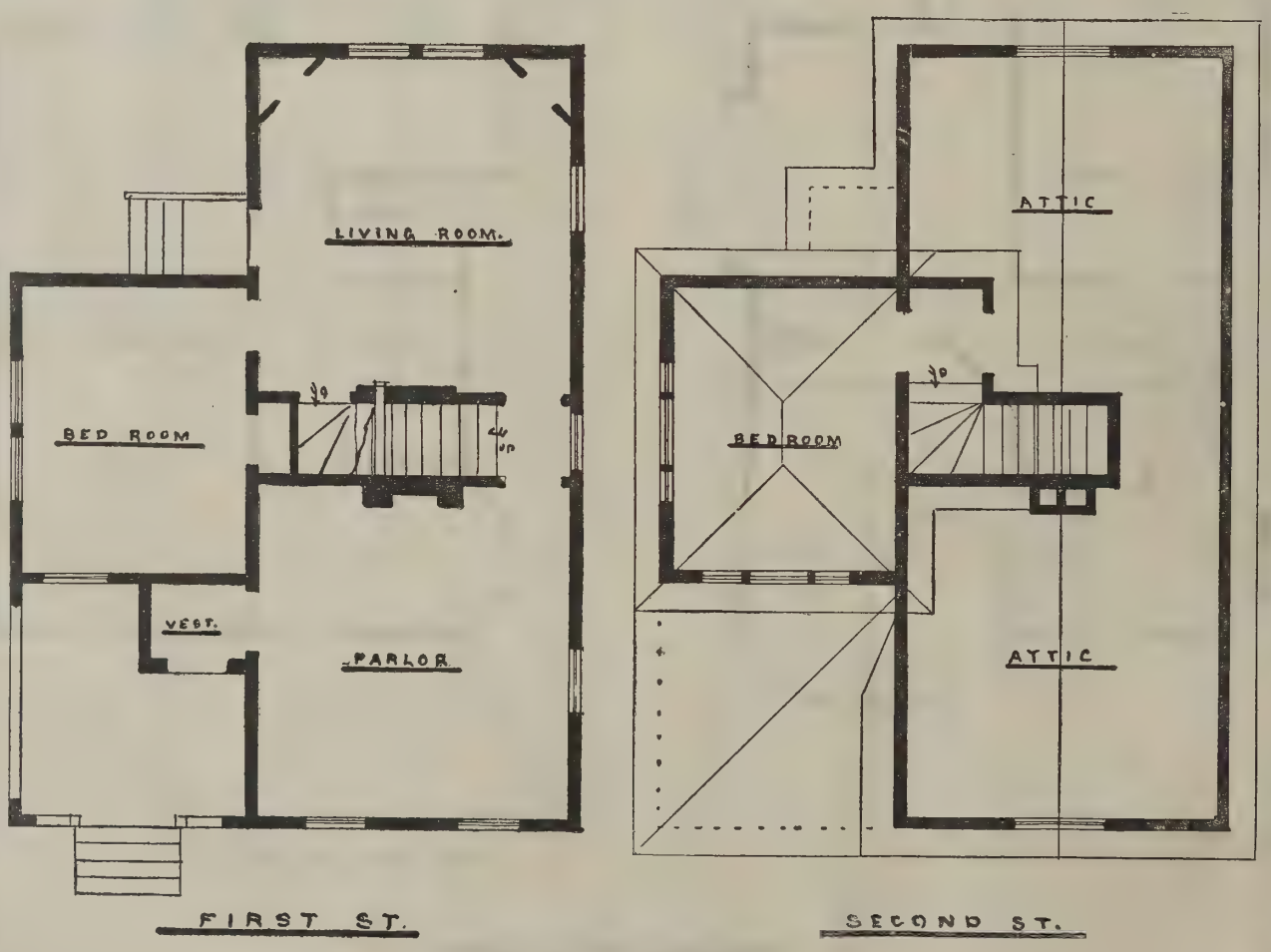
It is a very simple matter to clean out a boiler which has become greased upon the inside, if one knows how to go about it. *Grease* is insoluble in water. *Soap* is very soluble. Grease and soda combined form soap, which is easily blown out of the boiler. Therefore the easiest and simplest way to clean out a boiler which has become fouled up with grease is to dissolve a few pounds of soda ash or sal soda, from 10 to 25 pounds, in water, put it into the boiler, fill up with water, and build just a little fire, little more than enough to boil the water, raise say 3 to 5 pounds of steam, and let it run this way for a day or two. If enough soda was used, the boiler will be found, if blown off now, quite free from the adherent grease. It will only need to be washed out well to be in good condition. If there is any grease left, it is evidence that not enough soda was used, or that the boiling process might be continued for a greater length of time, and the operation should be repeated.

Of Food Economy before the American Association.

Professor Richards, of Boston, Massachusetts, gave a description of the cooking schools in that State. They found that such knowledge was best inculcated when the girls were taught at from 12 to 14 years of age. These lessons frequently resulted in such changes of cooking in the homes of the girls as manifested beneficial results in the manners, dispositions, and morals of the family. She advocated industrial cooking schools in connection with the public schools.

AN $1,800 COTTAGE.

Our illustrations show a design for a cottage sent to us by Mr. Geo. R. Madden, of West New Brighton, N. Y. It will be seen from the floor plans, drawn ⅛ inch to the foot, that the house has a front of 24 ft. All the rooms are of good size. Height of first story 9 ft. 6 in. in the clear, second story 8 ft. Cost $1,800. This does not include furnace and modern improvements.



AN $1,800 COTTAGE.

Practical Use of Marble.

BY ARTHUR LEE.

The marbles of the whole world are to day at the disposal of the architect. The practical question for his consideration is where and how to use them.

In northern climates the use of marble is almost entirely confined to indoor purposes. The beauty of the colored marbles does not appear until they are polished, and no marble will retain a polished surface for long under exposure to the weather. As a general rule, therefore, marble is unfit for outside work. The principal exception is that of the hardest Sicilian marble. The beauty of this stone is not dependent upon its retention of a polished surface, and if due care is exercised upon its selection it will bear exposure very well. The best Sicilian for outdoor purposes is of a perfectly even texture and color, so hard as to emit a clear ringing sound when struck, and of highly crystalline formation. Veined Sicilian should never be used in situations in which it will be exposed to the weather. A decided vein marks the line where disintegration will commence.

To make the most and the best of veined and colored marble, a great deal depends upon the way in which a block is cut. It should be so sawn that the figure is displayed to advantage. These marbles are, however, usually employed in thin sawn slabs, and a buyer has little difficulty in finding that which best pleases his taste. With Sicilian and statuary, which are frequently required in masses and in block, the selection becomes more difficult.

Never select blocks in bright sunshine. The best time is on a cloudy day after a shower of rain, and early in the morning. If a block can be ' looked into " at all, it will be then. In selecting blocks of statuary, a sharp lookout should be kept for yellow spots or veins; they are less likely to be noticed than black ones, which are more easily discovered. Much of the statuary imported from Italy is unfit for sculpture at all. It is very white, with a bright sparkling crystal and a taking appearance; but it crumbles under the chisel, is of a soft sugary substance, and very quickly decays. The best blocks are hard and close grained, and if of uniform tint are none the worse for a slightly yellowish cast. They work evenly under the chisel, and are not too transparent.

The best white marbles of Italy are eminently suited for sculpture. In no other material is it possible for the conception of the artist to be reproduced in permanent form with such satisfactory result. The hardness of these marbles and the fineness of their grain give effect to the most delicate touches of the chisel. The purity of white marble is in itself an aid to the grace and beauty of the composition. It has one distinct advantage over bronze or any material which requires to be cast. The last touches in marble are those of the artist himself. In all cast work they are perforce those of the founder and his men. Polished marble will not harmonize with a material which presents a rough surface. It does well with glazed tiles, burnished metal, and polished woodwork. It is very suitable for the ornamentation of fireplaces. For this purpose an unpolished stone is apt to become dirty, and the employment of wood is attended with danger. In all situations in which bare stone is left to be touched or brushed against, marble is the only material to be tolerated. It is not enough for the architect to see samples of the marbles which he means to employ. He should be careful to inquire into the soundness of the material, and of the size of the blocks which can be procured. He should also see samples which are of sufficient size to give a good idea of color and effect. Some marbles may be obtained in which color and texture are fairly average throughout large slabs or blocks. In others there is an entire difference in the space of a few inches.

Some marbles are only to be obtained in small blocks, and it is useless to specify them for situations in which single pieces of large size are required. Some marbles are so full of earth cracks and vents that they are quite unsuitable for any work in which they are required to give support, as, for instance, in the matter of columns. It is not long since that the columns of a new church built in Paris were constructed of a marble which was unfit for this particular purpose. The result was that even before the building was completed weakness was exhibited in the shape of several formidable cracks in the columns, and in the end the whole of the work was taken down and rebuilt. A vast amount of trouble and disappointment may be saved by a little inquiry before a specification is decided upon.

It will be found that the adoption of this step will almost always result in a very considerable saving of cost. Of two marbles which produce a similar effect, the one may cost in working three times as much as the other. In some situations it may be an advantage to build up intricate mouldings out of thin slabs. Working out of the solid may mean the spoiling of a design or a cost which becomes prohibitive. The selection of the marbles with which different parts of a design are to be carried out is of more consequence in the matter of cost than appears at first sight. Other factors being equal, it is well for the stone which is most easily manipulated to be employed in those portions of a design in which there is most work. Too frequently the consideration of these matters is left until after a plan is made and a specification prepared. In such cases money is thrown away which might have been usefully employed in another direction, the work is altogether abandoned, or the inquiries which should have been made first are made last, at an expense of time and trouble which might have been easily saved.

The harder marbles afford excellent material for the construction of steps and staircases. A flight of marble steps is not only beautiful in appearance, but it is calculated to withstand an enormous amount of wear and tear. In selecting marble for this purpose, it should be remembered that the effect of a flight of steps depends upon the regularity and evenness of the lines and the simple alternation of light and shade in the tread and riser. Colored marbles with strong markings or veins are not suitable. The self-colored marbles or one of the dull gray varieties should be employed. The even color of Sicilian, Correblanchien, and of Istrian marbles makes them especially useful for this purpose. The effect which should be produced by a fine flight of steps is ruined by the employment of a marble in which the veins run obliquely and distort the horizontal lines, or in which waves of color disturb the effect of simple breadth of light and shade. These remarks apply equally to moulded work. Heavily veined marble destroys all the beauty of the lines of mouldings.

As far as possible, work of this description should be carried out in plain black, white, or gray. Generally, finished work in marble is polished. The effect of reflection from a highly polished surface should be carefully borne in mind, otherwise it will be found that some members of a moulding will be completely obliterated in certain lights.

The variegated marbles should be reserved for flat surface decoration. Due care should be taken that the size of the panel or slab is sufficient to display the variety of the markings. If this is not done, half the beauty of the marble will be lost. In small panels, a marble which has close, fine markings should alone be used. The only exception to the general rule as to the employment of veined or variegated marbles is in the case of columns. The smooth cylindrical face of a column shows off the beauty of the markings as well as, or better than, a flat surface. If the column is fluted, the objection to these marbles again returns in full force.

Marble may be most usefully employed for the paving of halls and passages, and of rooms in which much traffic is expected. A floor of marble mosaic is one of the most beautiful and at the same time one of the most durable which it is possible to construct. Marble tile floors are very common in churches and public buildings in Continental Europe. Their cost as compared with tiles made of clay has operated against their employment in England. Modern machinery and competition have now removed this obstacle, and marble tiles can be obtained which very little, if at all, exceed the cost of the ordinary encaustic tiles. If a clay tile pavement which has been much used is examined, it will be found that each tile is worn more or less hollow in the center. A similar traffic over marble tiles produces scarcely perceptible results.

Some most useful rules with respect to the employment of marble have been laid down by Mr. T. Graham Jackson. They are as follows :

"1. Decorative carving in marble—as, for instance, in cornices, capitals, and friezes, where high relief and bold design are required—should be severe and conventional. Naturalism is forbidden by the stubbornness of the material except in the highest subjects, such as the human figure, which repays the expense of labor, or else in very low reliefs, where the labor of execution is reduced within moderate limits.

"2. Sculpture should be in white marble, or if in alabaster, only in such as is free from veins or stains of color.

"3. Moulded architectural features, such as vases, bands, strings, cornices, architraves, and abaci, should be either in white or some uniform color, without markings or veins.

"4. Variegated marbles should be used only for panels or columns, or, in other words, on plain, smooth surfaces, either flat or curved, so as to display the beauty of their markings to the utmost, without interfering with any of the structural lines of the architecture.

"5. Colored marbles should be used with moderation, too great a variety being avoided, and those of the quieter and more harmonious tones preferred for general use.

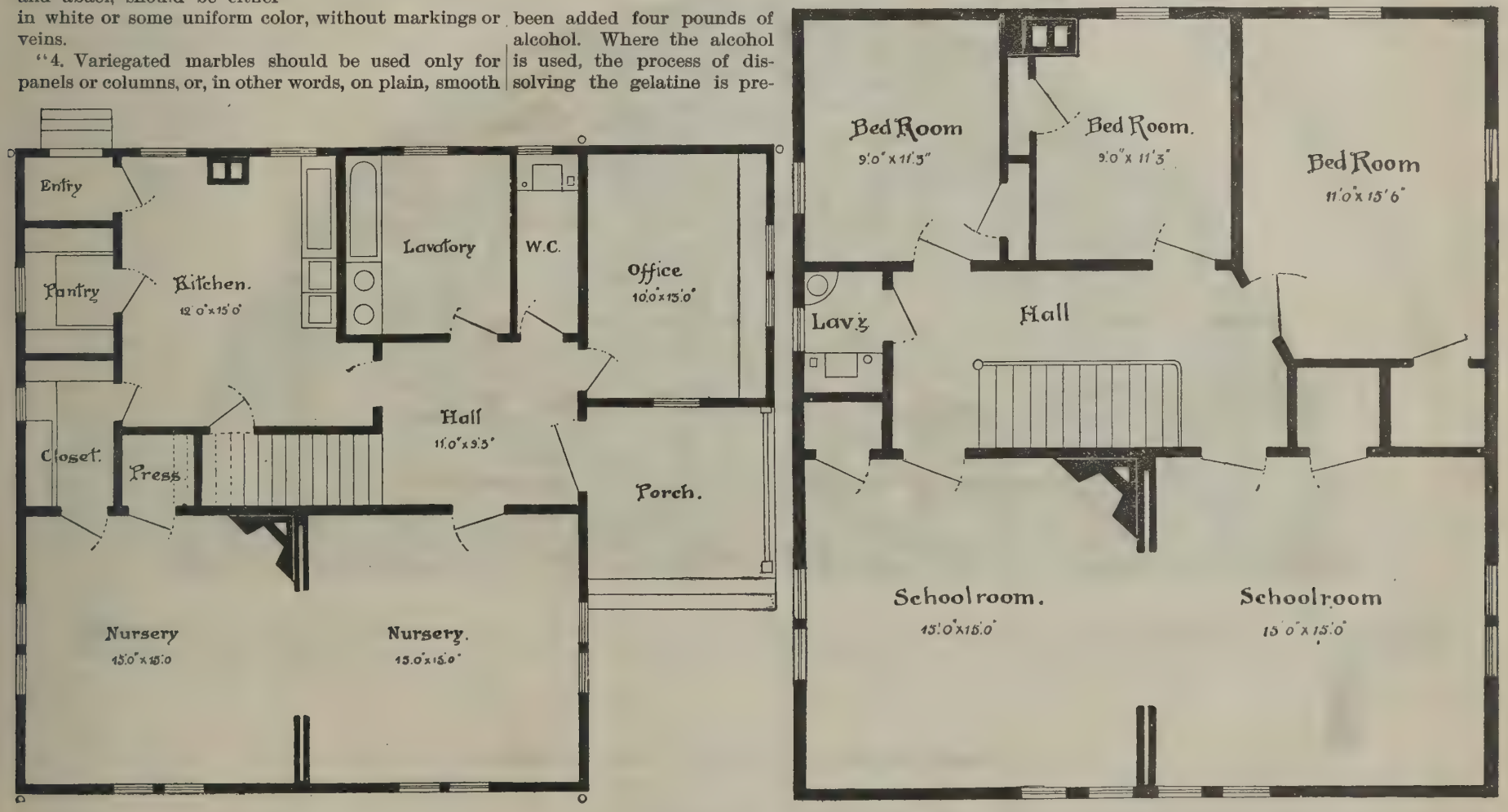
"6. Strong contrasts of color on a large scale are dangerous, and generally incline to vulgarity.

"7. Strong contrasts on a small scale, as in mosaics and inlaid work, are necessary.

"8. Stone and marble should be kept apart as much as possible."—*Building News.*

A SCHOOL HOUSE AND NURSERY.

We give illustrations of the Grace Memorial House, at Providence, R. I., a building designed for the special accommodation and instruction of young children. Edward I. Nickerson, Providence, architect. The estimated cost is $4,000.



GRACE MEMORIAL HOUSE, PROVIDENCE, R. I.

A New Composition.

This is a new composition designed for use in the production of all manner of moulded objects of a useful and ornamental character.

The composition is made by taking ten pounds of commercial gelatine and dissolving it in about thirty pounds of water, to which, by preference, there has been added four pounds of alcohol. Where the alcohol is used, the process of dissolving the gelatine is preferably carried on in a close steam-tight vessel by the aid of heat. Dried raw untanned depilated animal skins, by preference rabbit skins, which have been cut into fine bits or strips, or reduced to shreds, are next taken and placed in about thirty pounds of hot water and thoroughly cooked and digested in a steam kettle until the water is evaporated from them and they are left in a soft, gelatinous mass. The reduced skins are then added to the hot solution of gelatine and thoroughly stirred therein, the solution being kept hot and well agitated in a steam kettle or digester. To this hot solution of gelatine and reduced skins are added about two pounds of Venetian turpentine, two pounds of linseed oil, and six pounds of resin or equivalent gum, and the mixture is then brought to the boiling point and kept at this temperature while being thoroughly stirred and agitated until all the foam and froth, which will arise therefrom, settles and disappears and the ingredients are fully combined and admixed, care being taken to prevent the boiling mass from running over during the operation.

When the compound is properly prepared, twenty pounds of paper pulp are added, and the mixture is beaten by means of dashers or other appliances for the purpose until the whole is reduced to a slimy mass of uniform consistency ; and, finally, to this viscid mass there is added sufficient pulverized alabaster or marble dust or equivalent pulverulent mineral matter to bring it to about the consistency of soft putty, the thorough admixture and incorporation of the pulverulent substance in the mass being produced by kneading it and working it as dough with the hands or by means of any known mechanical devices for the purpose. The plastic composition thus obtained may then be laid in a thin coat upon a sheet or web of fibrous material or textile fabric and carried between two metallic compressing rollers, one or both of which are either plain or engraved or embossed with any desired pattern, which will operate to firmly unite the composition to the fibrous web, or it may be moulded in suitable moulds into useful and ornamental figures and shapes of all varieties.

When formed in plain sheets, the sheets may be placed under dies which shall operate by pressure thereon to emboss the surface with any desired pattern. The sheets, plates, or objects thus formed of the plastic composition are finally allowed to dry and harden, and will then be both waterproof and fireproof. The hardening process is usually completed under ordinary atmospheric influence within twenty four hours.

The product is said to be admirably adapted as a covering for walls in the place of paper, and its application to the purposes of decorative art admits of infinite variety and modification.

TO DISTINGUISH IRON FROM STEEL.—By breaking and comparing crystallized surface, steel will show a homogeneous, granular surface; iron will show a streaky or fibrous surface.

ORNAMENTAL PANEL OF A GOTHIC ALTAR IN THE CHURCH OF ST. EGIDIEN, IN BARTFELD, HUNGARY.

FANLIGHT GRATING IN A HOUSE IN BOTZEN, AUSTRIA.

SUGGESTIONS IN DECORATIVE ART.

The Ideal House of the Future.

There is no doubt that the ideal house of the future, whether large or small, will be in the country, and that this massing together of humanity to be found now in our great cities will come to be considered simply barbarous. Even for the rich, who can claim fullest space the city, with its undercurrent of crowded, festering, noisome life, holds contamination; while for the poor themselves, what word is strong enough to express the degradation of the word home that is theirs!

Nor is it possible, even under the most favorable circumstances, to count "flats" or apartments as anything more than the travesty of comfort in its best sense. Ruskin is right when he denies to cities any possibility of the best development for human life; and though they have their uses, and we could ill dispense with many good things to which they have given birth, they are responsible for such hideous evils that one longs at moments to see them, their pride and their magnificence, and "the bitter cry of outcast" life in their midst, engulfed like those lost cities of old.

The home spirit is strong in many a city flat, and consecrates many a stately mansion as well as the narrowest tenement; but the true home must be in the country, quite accessible, it may be, from the city, but always owning certain indispensable and inalienable characteristics. The house that has not its own bit of land, its own possibilities in the way of garden or orchard, even if that orchard sum up as only one old apple tree, has not the right to the title "comfortable." Building associations all over the country are making building possible for even very limited incomes, and these associations are supplemented by work from our architects that gives us every form of inexpensive design, and proves that beauty and cheapness can go hand in hand.—*Cosmopolitan.*

THE cause of single and double rainbows is due to the combined reflection and refraction of the sun's rays from drops of rain. The rain must be on the side away from the observer. The position of the rainbow depends on the height of the sun, and rain drops at different definite elevations can produce the effect, so that double or triple rainbows are possible.

A SEASHORE OR BEACH HOUSE.

We give from *Building* a very pretty sketch for a seashore residence. It is picturesque, roomy, has a spacious piazza, and presents several other attractive features. The cost for such a dwelling would be about ten thousand dollars.

Exhibition of Building Materials, Brussels.

A leading feature in the programme of the Belgian Society of Engineers and Manufacturers is the holding of special exhibitions, of which, besides the loan collection of M. De Lesseps' plans and models of the Suez and Panama canals, four have already taken place, viz., iron and steel permanent way for railways and tramways; methods of illumination, retrospective and actual; India-rubber and its applications; and telephonic apparatus. These have been held in the society's hall, forming part of the Brussels Bourse; and lectures connected with the subject of exhibition or individual exhibits have been given on Friday evenings. Such has been the interest attaching to these exhibitions, that latterly they have been open to the public at a small fee.

The fifth exhibition, which remained open until the 19th June, was devoted to building materials found or made in Belgium, but excluding the metals, and has drawn together a large number of materials a few of which merit notice on account of their interesting character or novelty. The Belgian marbles, which are largely exported to England for mantel pieces, are well represented, the Societe Anonyme de Merbes-le-Chateau sending no fewer than twenty specimens. It may be mentioned, incidentally, that it is chiefly the red varieties, of which the Rouge Royal is a type, that are known in England; but the black with white veins also merit attention.

Specimens of the principal Belgian marbles, prepared like microscope subjects for studying the origin and structure of the Devonian limestones, have been lent by the director of the Brussels Natural History Museum. They are only one-tenth of a millimeter thick, and have been prepared by grinding one face perfectly true and smooth, and cementing a glass plate to it, the other side being ground down to the desired thickness, and also protected by a glass plate. Placed in vertical frames, the specimens may be examined, with the aid of the magnifying glass, by looking through them toward the natural or an artificial light.

The floor shown by Damman and Cassard consists of shallow concrete arches turned between light rolled iron or steel joists, the concrete having internal dovetails left in its upper surface, which is made flat, and completely covers the joists. Over this surface liquid asphalt is poured, and while it is still hot the pieces of wood forming the *parqueterie* are bedded in it. Grooves are made in their longitudinal lower edges, two of them forming together an internal dovetail, so that when the asphalt sets it securely clamps the wood down to the concrete. The floor thus produced is solid and noiseless, while at the same time being sound proof, damp proof, and practically fire proof. A modification of the above, in which the *parqueterie* pieces are connected with asphalt to tiles having a conical hole in the middle of each, has been laid down at the Hotel de Ville, the Palais de Justice, and the Palais de la Nation, Brussels.

The Societe Anonyme des Fours de Laeken makes hollow slabs of plaster of Paris for filling up the space between two rolled joists. The Societe Anonyme des Deux Nethes accomplishes the same object with *hourdis*, or slabs made of burnt clay, hollowed out in the direction of their length, and provided with longitudinal ribs or feathers for strength. Leon Champagne et Cie make for this purpose *voussettes*, or hollow bricks approaching in form to that of the wedge, which they claim to be quite as efficient and less costly.

Picha Freres. of Ghent, strengthen all their articles made of cement with a stout iron wire framework inserted in the middle during their formation. Renette et Cie, of Ghent, sink wells in sandy soils with the aid of hollow cylinders composed of concrete, coated and lined with cement, which not only prevent accidents due to earth falling in while sinking, but also secure a pure supply by intercepting surface water. In sinking a well, the ground is first leveled, and then the bottom ring, having its lower edge splayed out and beveled, so as to sink easily and make a way for the rest, is laid upon the surface. The earth inside is then excavated, when the ring sinks by its own weight. When its top is level with the surface, another ring is added; and the socket joint is cemented, so as to be water tight. This process is continued until water is reached, when a special dome-shaped ring with aperture is placed on the top, without, however, being cemented, in case it should afterward be found necessary to deepen the well.

A new roofing substance is shown by E. Perret, of Vilvorde, in his "unalterable cloth" for superseding the so-called bitumenized felt, which soon becomes disintegrated under a hot sun. The flax tissue is impregnated and coated with a bitumen derived from petroleum, to which are added small quantities of natural bitumen, resin, and chalk; and the upper side is sanded to prevent adhesion when the cloth is rolled up. The cloth is laid on battens, or on the rafters, which may be 12 or 15 inches apart, the lower portion of a sloping roof being covered first with a continuous length. Another length is then laid above, with a 3 inch lap, and so on till the roof is covered, the upper length being folded over the ridge. The cloth is held down by washers of the same secured by zinc nails, and requires no coat of tar or other substance.

A new drying oil for house painters, to take the place, at half the cost, of linseed oil, driers, and turpentine, is prepared from petroleum by Rave, Annez et Cie. Besides the lower cost, the special advantage is that the oil dries so quickly that several coats may be applied in a day—a matter of great importance when a temporary structure is required in a hurry. It is asserted that the oil will unite chemically with all paints except white lead, which may be replaced by zinc white, and chrome yellow, for which Naples yellow may be substituted. It is also claimed that this is the only oil that may without difficulty be laid on cement and combine with it, and through which tarred or bitumenized surfaces will not show.—*Jour. Soc. of Arts.*

FULL drawings, details, and specifications, ready for the builder, for any of the buildings illustrated in this publication, may be obtained at this office on moderate terms. Munn & Co., architects, 361 Broadway, N. Y.

Chimneys of the Ancients.

It has by some been considered doubtful whether the Greeks and Romans, during the period of their greatest eminence for architectural productions, had any chimneys in their dwelling houses; but as Homer, Aristophanes, Virgil, and Appian are supposed to mention or make allusion to them, it has been inferred by other writers that they were not wholly unknown to those ancient builders. The oldest certain account of the use of chimneys is stated to be 1347, and it is conjectured they were invented in Italy. Smoke jacks, which must have been invented subsequently to chimneys, are supposed to be of German origin; and, from a painting which is known to be older than 1350, it is supposed they were in use before that period. In the houses discovered at Herculaneum and Pompeii, there are, it is said, no chimneys; but they appear all to have been warmed by means of flues and a subterraneous furnace. Stoves and flues, it is thought probable, were introduced about the time of Nero. Seneca relates that, in his time, there were invented certain tubes, which were placed in the walls, by which the heat of the fire was made to circulate and warm equally the upper and lower apartments. These observations have been quoted as proofs that chimneys were unknown at those periods, but have they not a contrary tendency? It appears more probable that a chimney should furnish the idea for such stoves than the use of stoves should be known before chimneys. In the Old Testament there are several allusions to furnaces for the smelting of iron and other metals, which would appear to leave no doubt of the use of chimneys being known at a very early period, especially to the Egyptians (see Gen. xvii. 15, Deut. xx. 4, and Ezekiel xx 22). In Nehemiah, the towers of the furnaces are spoken of. In the First Book of Samuel, xxx. 30, a city is called the smoking furnace (Chor Ashan), probably from the number of chimneys erected in it. The Arabic root renders the word "round;" they were, no doubt, built in the form of a round tower of lofty height, like some of the chimneys of manufactories at the present day.—*Seth Smith.*

A SEA-SIDE DWELLING.

Preservation of Wood by Lime.

I have for many years been in the habit of preparing home-grown timber of the inferior sorts of fir—Scotch, spruce, and silver—by steeping it in a tank (that is, a hole dug in clay or peat, which was fairly water tight) in a saturated solution of lime. Its effect on the sap wood is to so harden it and fill the pores that it perfectly resists the attacks of the little wood-boring beetle, and makes it, in fact, equally as durable as the made wood. I have a mill which was lofted with Scotch fir prepared in this way in 1850, and it is in perfect preservation The timber is packed as closely as it will lie in the tank, water is let in, and unslaked lime is thrown on the top and well stirred about. There is no danger that the solution will not find its way to everything in the tank. I leave the wood in the solution from two to three months, by the end of which time an inch board will be fully permeated by it. Joists and beams would, of course, take a longer time for saturation; but in practice we find that the protection afforded by two to three months' steeping is sufficient if the scantlings are cut to the sizes at which they are to be used.—*Field.*

TENEMENT HOUSES OF MODERATE COST.

We give herewith illustrations of some tenement houses of pleasing appearance and moderate cost at Kansas City, for which we are indebted to the *Northwestern Architect*. We estimate the cost of these houses, in this vicinity, at $20,000 for the three. These buildings occupy a frontage of about 100 ft. by 50 ft.

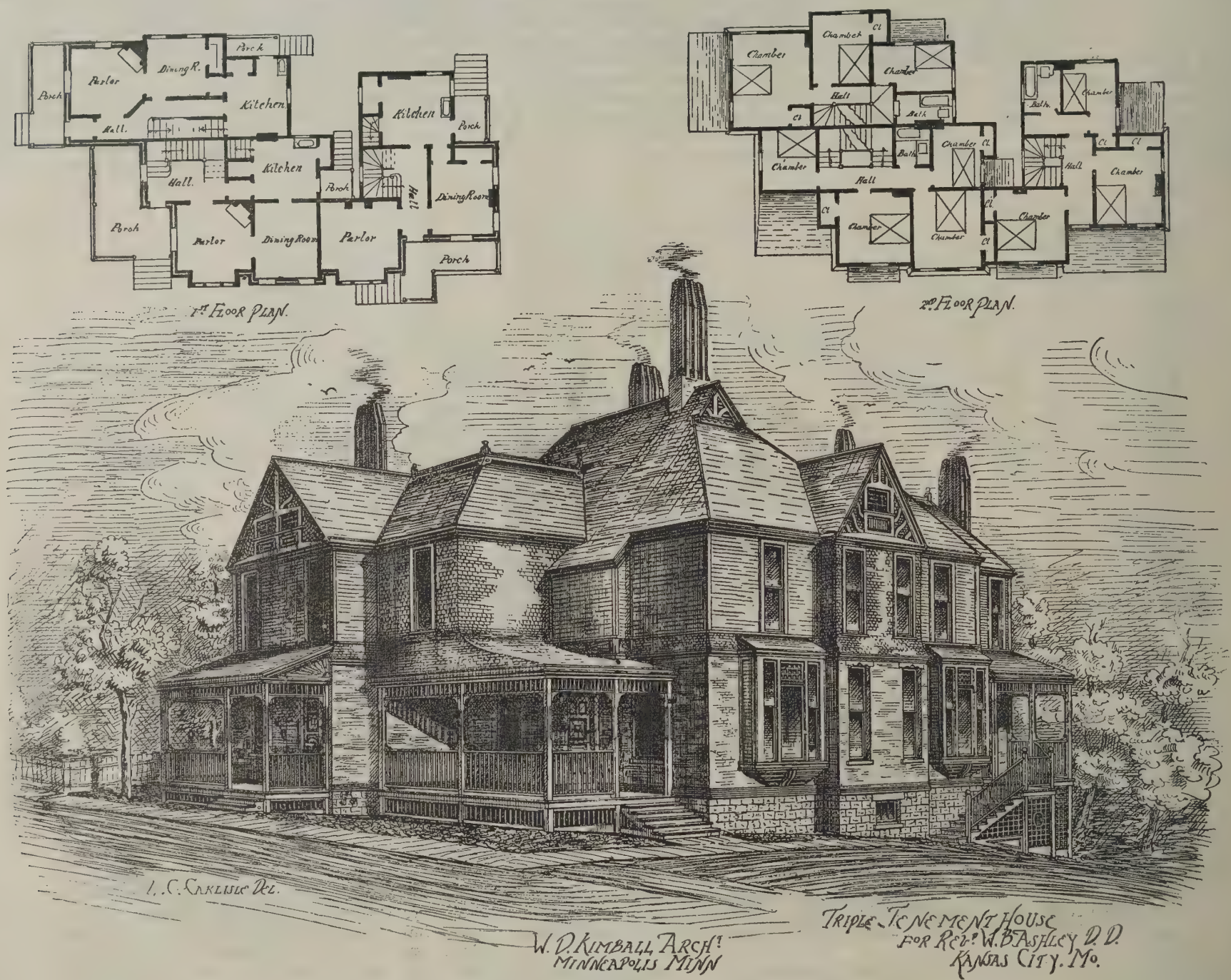
Vermont Marbles.

BY ARTHUR LEE.

The rise and progress of the marble trade in the United States of America has been of a most extraordinary character. The first marble quarry in the country was opened in Vermont in 1785. Shortly before the year 1800, works were erected for the sawing of marble at Marbledale, near New Milford, Connecticut. It is said that the first tombstone made out of American marble was erected in 1799, and was the work of one Jonas Stewart, a marble cutter of Dorset. An examination of the headstones in the graveyard at New Milford proves that the oldest of them are of sandstone from the Connecticut Valley, and of slate Those of marble is mottled and veined in a manner peculiar to itself. Some of it is dark, with a ground of deep blue, with nearly black veins. Another variety is nearly white with clouded veins. Both descriptions are sound, and take a good polish. Quarrying operations were commenced in 1836, although they were not pursued with much spirit until some years later. The quarries are well situated, above the railroad and mills, so that blocks are readily transported. The falls of the Otter are made use of as a motive power to drive the saws, the polishing beds in the finishing shops, and the drills in the quarry. It was here that the first successful channeling machine was employed. These machines are now in operation all over the States. It is calculated that since 1863 over five millions of square feet have been cut by them. The channeler is a locomotive machine which runs on steel rails placed on the quarry floor. The gang of cutters forming the drill is composed of five steel bars, 7 ft. to 15 ft. long, sharpened at the ends, and securely clamped together. The center cutter is the longest, and the two outside cutters are the shortest, so that the five form a kind of stepped opportunities for the extraction of large blocks. A small town has been built near the falls for the accommodation of the workers.

At Rutland, a pure white marble is found. There are several quarries in the neighborhood of the town, and the marble bears a high reputation. There are quaries of clouded and veined white, and of dove color as well as statuary. The marble is found on the western slop of a range of low hills running north and south. The thickness of the beds worked varies from 50 ft. to 120 ft. They are inclined at an angle which averages about 45°.

Quarrying operations were commenced in the year 1838, and a few years later trade in "Rutland marble" had become firmly established. The deposits proved to be abundant and of sound quality, and were sources of large profits to the proprietors. The marble industry of Rutland has been a prosperous one, and at the present time it is calculated that some 2,000 men find employment in the quarries, mills, and workshops. Rutland statuary is said to be too soft for ordinary purposes. This complaint may possibly arise from the



TENEMENT HOUSES OF MODERATE COST.

somewhat later date are of marble, and have been evidently worked by hand from the rough block. Those bearing a date soon after the beginning of the present century have been cut on one or both sides with a saw. The date of the first working of American marble is, therefore, fixed with tolerable certainty, and it is evident that a trade which has now assumed enormous proportions has been built up in less than a century.

Marble is now used for building purposes in the States on a scale which may astonish the architects of the Old World. In New York it is superseding the brown freestone or sandstone of which such a great part of the city is built. The great bulk of the trade centers in Vermont. In that State the quarries are worked with every mechanical means which the ingenuity of man has been able to devise. In the year 1882 it was calculated that the capital invested in the production of American marble in the States of Vermont, Massachusetts, Connecticut, New York, Pennsylvania, Maryland, and Tennessee was £2,500,000 sterling, two thirds of which was invested in quarries and one third in mills and machinery. The number of workmen engaged was 6,00', and the annual production amounted to 2,200,000 cubic feet, valued at £900,000.

The principal workings in Vermont are at Sutherland Falls, Rutland, and Dorset. The Sutherland Falls arrangement away from the center. As the machine runs backward and forward over the rails the cutters deliver their strokes at the rate of 150 per minute. Deep, narrow furrows are cut into the solid stones, and long parallel blocks are thus formed. Close after the channeler runs the gadding machine. This drills circular holes along the bottom and sides of the blocks, into which wedges are introduced, and the stone is split from the bed. The Wardwell channeling machine, which is most commonly in use, cuts a continuous groove at the rate of 75 to 150 square feet per day, thus doing the work which could be done by 50 to 100 men by the old hand process. The expense of working the machine is about £2 per day. The advantages gained by use of the machines are therefore obvious. The diamond gadder does its work at the rate of about 180 ft. per day as against 12 ft. by hand labor. Three men are required for each channeler and two for each gadder. As a consequence of this mode of getting the stone, the quarry appears like a hollow cube cut into a hill. The sides are nearly perpendicular walls, and the bottom is a marble floor over an acre in extent. Across this floor the channeling machines work.

Sutherland Falls marble is much used for building purposes. The spire of Grace Church, New York, is built of it. The formation of the beds gives great fact that the principal supply has hitherto been produced from the upper layers. It is now claimed that the lower layers have produced a statuary which is of a much better texture than any formerly worked. At the State House in Montpelier there is a statue of Ethan Allen of heroic size; this is the work of Larkin J. Mead, and is sculptured out of Rutland marble. The marble is certainly not so easy to work as that of Italy; it is what is called "plucky"—that is, given to breaking away before the chisel, unless great care is used.

The sand blast was first employed for the cutting of marble at some marble works in West Rutland in 1875-76. A contract was taken by which 254,000 lettered headstones, having dimensions of 3 ft. in length, 10 in. in width, and 4 in. in thickness, were placed in the national cemeteries at an expense to the government of about £173,000. The monuments were for the purpose of marking the graves of soldiers, and the application of the sand blast for the purpose of cutting the inscriptions enabled the work to be so cheaply done. Letters and figures of chilled iron were placed on the stone to be cut, and the blast was then turned on; the portions of the stone unprotected by the iron were eaten away by the force of the blast, and the inscriptions were left standing in relief. By this me-

thod the name, company, regiment, and rank of a soldier could be put upon a stone in less than five minutes of time.

Between Rutland and Sutherland Falls there is found the quarry of the Columbian Marble Company. This marble is almost black, but with a mottled surface; it is much used for mantelpieces and monuments.

At Pittsford there are three beds or veins of marble which run through the town north and south. The east bed is of the same character as Sutherland Falls marble, of which bed it is probably a continuation; the middle bed is separated from the easterly one by about 200 ft. of limestone rock. This bed is about 400 feet wide, and contains marble of all shades, ranging from white to dark blue. Marble from the Pittsford quarries has been used in the construction of several large buildings at Boston—notably the Continental building, Commonwealth hotel, and the Blackstone National Bank building.

About a mile to the south of Pittsford some marble is quarried known as "Florence marble." It is dark blue in color, mottled and veined. The quarries were first opened in 1880, and the production rapidly assumed large proportions. In 1884 it was calculated that the output was nearly 10,000 tons.

Another dark, dove-colored marble is found at Brandon. Several quarries have been opened near this town, but only one is now in active operation.

At Middlebury there are extensive deposits of white marble, which some years ago were very largely worked. Little in this way has been done of late, as the marble, although of good color, has proved to be so generally unsound that the working of it has not been remunerative.

The first attempt to manufacture marble upon a large scale which was made in the States originated in Middlebury. In a history of this town by Judge Swift, there is an interesting quotation from a pamphlet written by Professor Frederick Hall, and published as long ago as 1821, which is as follows:

"Proceeding down the creek on the western side, after passing two sawmills, two grist mills, a clothier's works, and some other establishments of minor importance, you come to the marble factory.

The marble of this village, which is now wrought on a large scale, and is extensively approved over the country, was discovered by Eben W. Judd, the present proprietor, as early as 1802. A building on a limited plan was erected, and machinery for sawing the marble was thus put in operation. In 1806 a new and commodious building, two stories high, and destined to comprise sixty saws to be moved by water, was erected. In 1808 this enlarged establishment went into operation, and has continued to the present day.

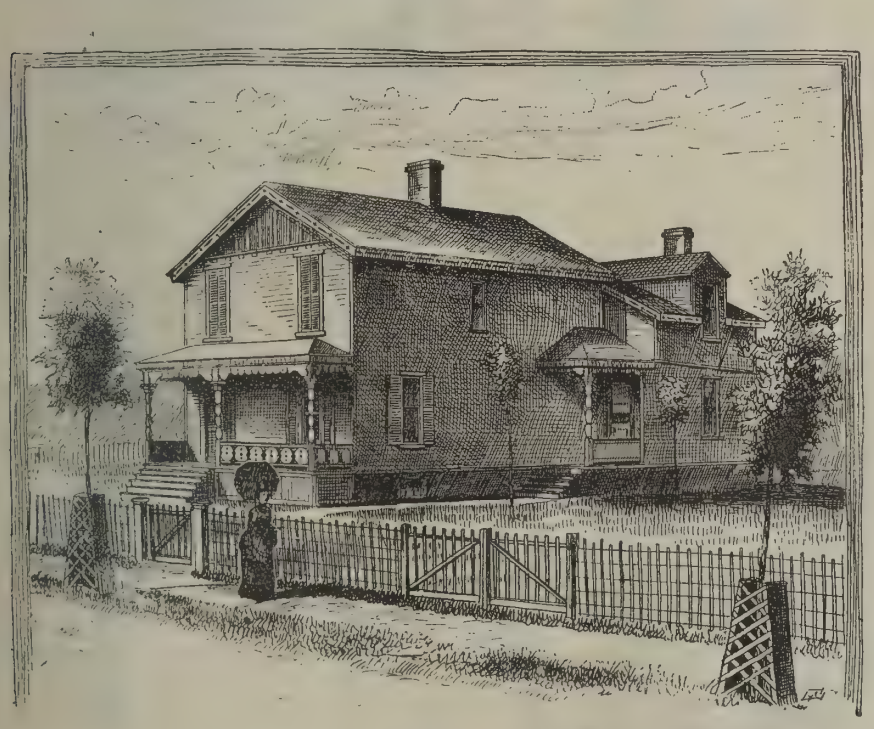
"The saws are made of soft iron without teeth, and are similar in form to those which are used for sawing marble by hand in the large cities in Europe The marble until lately has been obtained chiefly from a quarry situated within a few feet of the mill. It is raised from its bed partly by means of wedges, but principally by blasting. The marble, after being sawed into slabs, is manufactured into tombstones, curriers' tables, panels, mantelpieces, hearths, window and door caps and sills, sideboards, sinks, and various other kinds of furniture. These articles are transported to Montreal, Quebec, Boston, New York, and even Georgia The machinery has sawn annually from five to ten thousand feet since the year 1808."

At Larrabee's Point, in Shoreham, Addison County, there are deposits of black marble which closely approach Kilkenny marble in appearance. The quarries are not now in active operation, but several polished chimney pieces made of it are to be found in some of the older houses in the neighborhood. At one time it appears to have been in much favor.

La Motte marble is another black marble of similar character, but more fossilized. It is found near the west shore of the island of La Motte in Lake Champlain. It is in considerable demand for the making of flooring tiles, and finds some employment for monumental purposes.

At Swanton, in Franklin County, there is found a dove-colored marble, which was much used for gravestones down to the year 1850. In that year the work-

No. 1.



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No. 3.

EXAMPLES OF SUBURBAN HOUSES AT HAMILTON HEIGHTS, FORT HAMILTON, N. Y.

sawing plant was in full swing, the harder layers of stone were worked, and the sawn marble found a ready market In 1840, before the introduction of Italian and Rutland marble, the demand for Dorset marble was beyond the supply.

What is known as Vermont Italian marble is worked up the mountain at East Dorset. This marble is almost exclusively used for monumental and decorative purposes. The production reaches an annual average of over 30,000 cubic feet.

A quarry known as the Freedley Quarry, situated a little further to the north, has been worked since 1820, and is still producing a white marble, much used for building purposes. The quarry is high up in the mountain, and the blocks are sent down by means of an inclined railroad. The annual production of the Freedley quarry averages 40,000 cubic feet.—*Building News.*

SUBURBAN HOUSES.

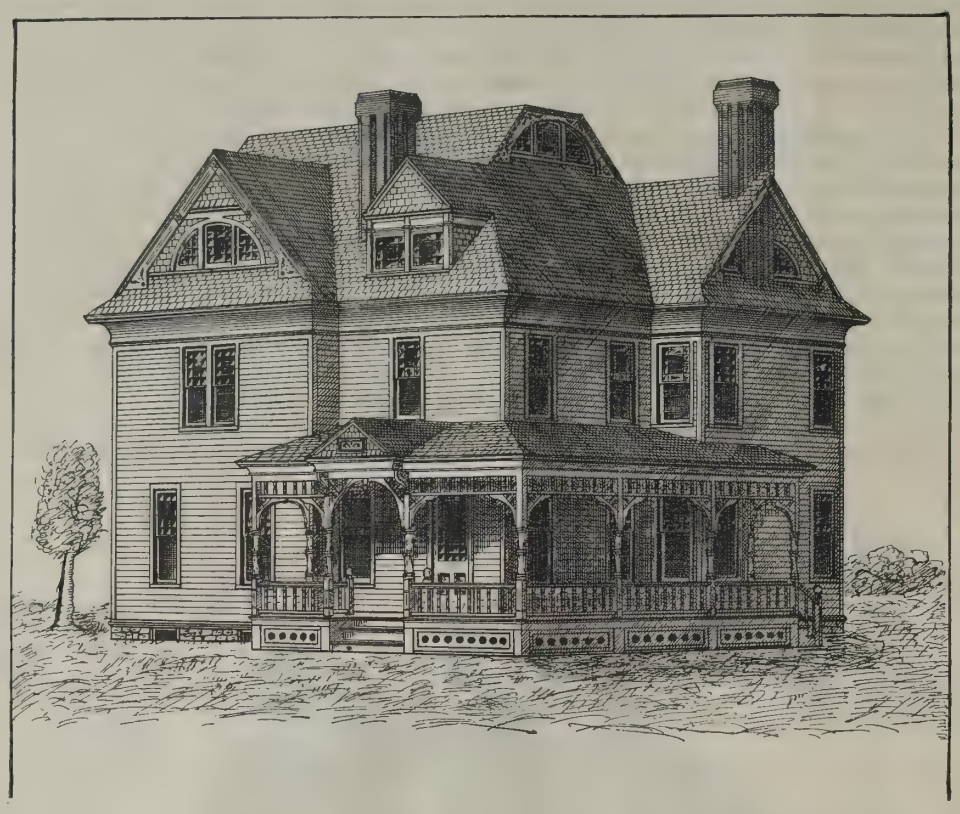
We give from the *Real Estate and Builders' Monthly* three designs for dwellings of moderate cost. No. 1 may be erected in this vicinity for about $4,200; No. 2 will cost about $3,200, and No. 3, $5,200.

Snow Sheds on the Cascade Mountains.

A short time ago there appeared a statement to the effect that the Northern Pacific Railroad would have to snow-shed about forty miles of its line, to protect it during the winter months. This is erroneous. The length of the mountain grades and switchback entire (the only portion of the line where sheds will be required) is but 20 miles, and only a portion of this will require snow sheds. We are informed by division engineer Huson that the entire amount of snow sheds required on the Cascade division will not exceed eight miles. Statements have also appeared in various papers as to the probability of blockades upon this portion of the road in the future. A comparison with the Central Pacific Railroad may be of interest in this connection. On the latter road, through Blue Canyon and Emigrant Gap, there are 30 miles of continuous snow sheds, and the snow falls to the depth of twenty-four feet. The greatest depth upon the grade of the switchback last winter (which was unusually severe) was less than fifteen feet. With the road in operation, plows running continually to prevent the snow from accumulating upon the track, and the protection afforded by the sheds to be erected, the chances for blockades are slight. When the big tunnel is completed next year, and the seven miles of switchback line are dispensed with, the probability of blockades will be still more remote.—*Ellensburg (Wash. Ter.) Leader.*

AN OHIO DWELLING.

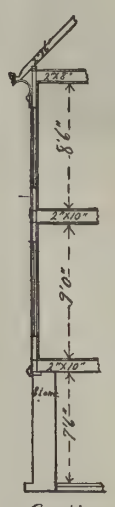
We give the plans, elevations, and perspective view of an eight room house, the estimated cost of which is about $5,000 in this vicinity. W. C. Bartell, architect, Tiffin, Ohio. The estimates include hardwood mantels for library, dining room, and sitting room, and Jackson ventilating grates for each. The plumbing consists of bath tub, water closet, and wash bowl in bath room, and washbowl in space between kitchen and hall, and boiler connected to range in kitchen. A sideboard in dining room, hardwood finish on first floor, and pine finish on second floor, and to be first class throughout.



The Corner Finish.

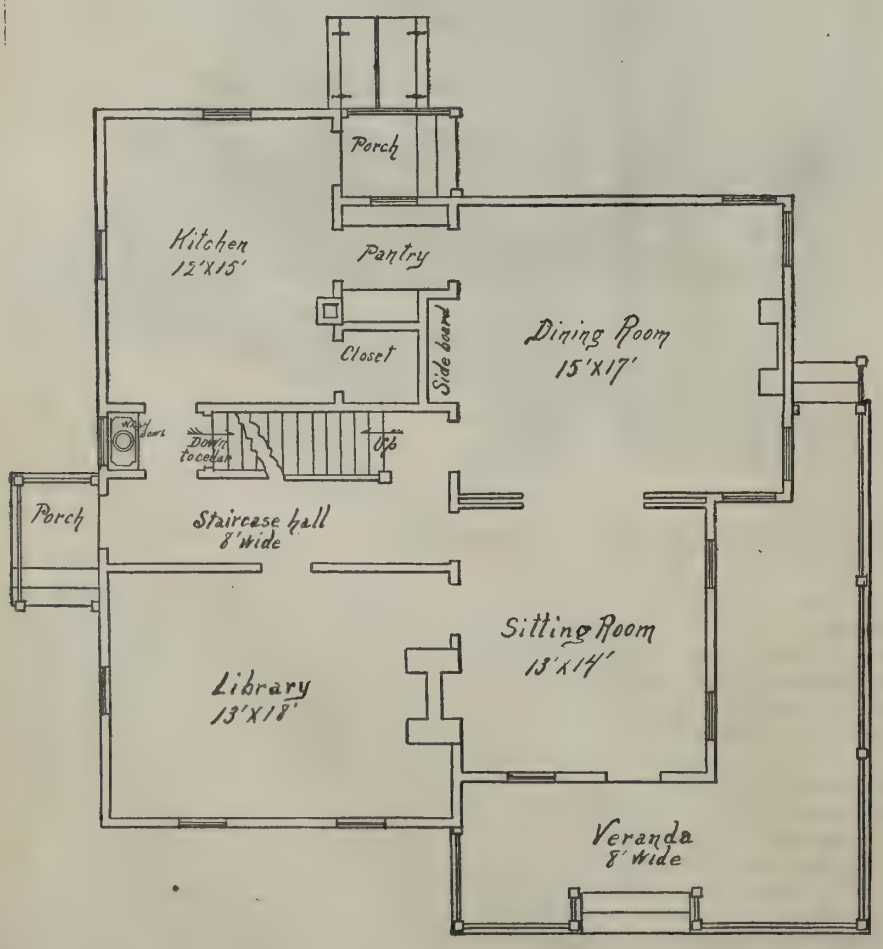
A correspondent of the *American Architect* says: The Buffalo architects have adopted one usage which is not entirely unknown about Boston, though there seems to be a feeling here that it is not practicable. Every one knows how troublesome it is to satisfactorily arrange the corner boards of a clapboarded house. A regular pilaster finish, such as looks so well with a colonial design, is not always desirable or possible, and an ordinary corner board is apt to unpleasantly mark the angles of the house just where the architect would wish to keep them as unobtrusive as possible. In much of the more recent Buffalo work this difficulty is obviated by simply omitting the corner boards entirely. The corner is flashed with zinc against the boarding and the clapboards are run out to the edge and mitered, or cross-lapped like shingles. In either case, the corner is perfectly tight against the weather. There is a house on North Street, just beyond Delaware Avenue, which well illustrates this usage, and is besides so successful in its color that it is worth while to notice it a little in detail. The lower story is in a rather dark red brick. The second story is clapboarded and portions of the gables are shingled, both surfaces being stained a rich, warm brown. The upper portion of the front gable is filled with rough plaster, stuck over with bits of opaque glass, and left a light gray tone. The roof is covered with blue slate. The outside finish is painted a dull Venetian red in the lower story, the architraves, etc., above being a very dark green, the sashes red, and the inside blinds white. The general effect is charming, just enough brightness about the windows to relieve the general sober colors, and with only the difference in texture between clapboards and shingles to mark the two upper stories. Dark tones for house painting seem to be the rule in Buffalo.

Front Elevation Scale ¼" to the ft.

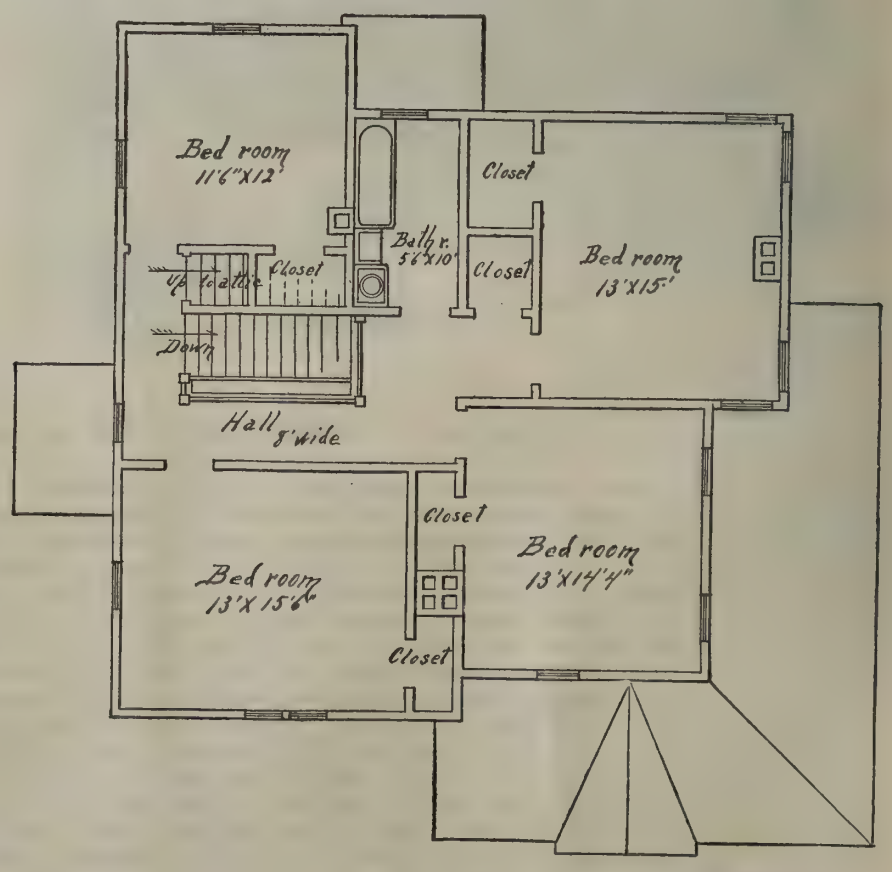


Section

Side Elevation (Right) Scale ¼" to the ft.



First Floor Plan



Second Floor Plan

AN OHIO DWELLING.

Granite.

True granite in its most ordinary form is one of the most easily described and certainly recognized of all rocks. It is a granular, crystalline aggregate of the three minerals feldspar, mica, and quartz. Its name is sometimes said to be derived from its granular structure, but Jameson derives it from "geranites," a term used by Pliny to designate a particular kind of stone. Ordinary granite varies according to the composition of feldspar and mica composing it, according to the relative proportions of those minerals to each other and to the quartz, and according to the size of the crystals and the state of aggregation of the several constituents. The feldspar of granite may be either orthoclase or potash feldspar, frequently flesh colored, but sometimes white; albite or soda feldspar, generally dead white; an intermixture of these two minerals; or, lastly, a feldspar containing both potash and soda, which may be called soda orthoclase or potash albite, as the case may be. Other varieties of feldspar, except, perhaps, in some instances oligoclase, are never found in granite as constituents of the mass. The mica of granite varies greatly in color and luster, being sometimes dark, coppery brown, passing into black, sometimes green, sometimes golden yellow, and sometimes a pure silvery white. Whether its chemical constitution be equally various is, perhaps, hardly yet sufficiently ascertained. The quartz is commonly colorless or white, but sometimes dark gray or brown. The proportions of the three constituents vary indefinitely, with this limitation—that the feldspar is always an essential ingredient, and never forms less than a third, rarely less than half, the mass, and generally a still larger proportion. Sometimes the mica, sometimes the quartz, becomes so minute as to be barely perceptible. The state of aggregation of the mass varies also greatly, some granites being very close and fine grained, others largely and coarsely crystalline. The colors of the rock are generally either red, gray, or white; the first when the feldspar is fresh colored, the latter when it is pure white, the intermediate gray tints depending chiefly on the abundance and color of the mica, but sometimes on that of the quartz. Large and distinct crystals of feldspar sometimes occur disseminated at intervals through the mass, giving the rock a porphyritic texture. It is then called porphyritic granite. Other minerals besides the three mentioned above sometimes occur in granite. Among these are hornblende, actinolite, tourmaline, schorlchlorite, and steatite. When hornblende is abundant in rock, and the mica becomes scarce or altogether disappears, it becomes a syenite.—*J. B. Jukes.*

DESIGN FOR A BANK BUILDING.

We give the front elevation of the new Third National Bank building at Knoxville, Tenn., built for Mr. Frank McNulty, Baumann Brothers, architects.

The building is constructed of Tennessee marble, has an open timber roof, plate and art stained glass in front, tile floor; interior finish is of oak, fitted with latest improved bank fixtures.

The cost was ten thousand dollars. It is a very attractive and elegant design.

Brick Dust Cement.

According to a statement of Mr. Miles, a well-known engineer, it is a fact peculiar to Spanish countries that ordinary brick dust, made from hard burned, finely pulverized bricks, and mixed with common lime and sand, is universally and successfully employed as a substitute for hydraulic cement. Mr. Miles says that during an engineering experience of some six years in Cuba, his opportunities were ample for testing its merits, and he found it in all respects superior to the best Rosendale hydraulic cement for culverts, drains, tanks, or cisterns, and even for roofs. In an experiment to test the strength of this product, it was found that a block of it, one-half inch in thickness, without sand, and after an immersion in water for four months, bore, without crushing, crumbling, or splitting, a pressure of fifteen pounds per square inch. It is thought that, by the addition of pulverizing mills to brick yards, to utilize the waste and broken bricks, a profitable manufacture might be carried on.

A BELL, for which the claim is advanced that it is the largest in the world, has just been christened at Berlin by the Archbishop of Cologne, in the presence of the civil and military authorities of the district. It is hung in the cathedral, and is called the "Emperor Bell." It received the name of "Gloriosa" at the christening.

THE PIETSCH HOUSE TRAP.

We illustrate herewith several views of the sewer gas trap devised by Mr. Herman Pietsch, of 360 Fulton Street, Brooklyn, N. Y., which has lately attracted considerable attention on account of the favorable report upon it made by the Brooklyn health board. The

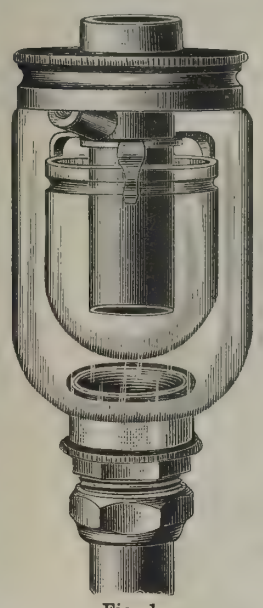


Fig. 1.

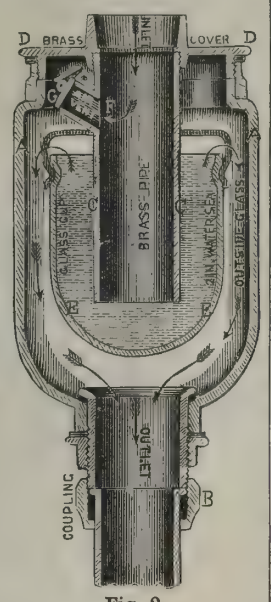


Fig. 2.

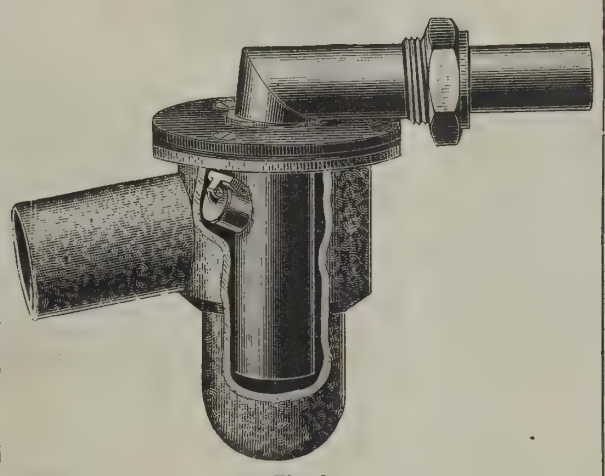


Fig. 3.

device has been known and used for several years, and has made a good record for itself in respect to the special claims made for it by the inventor on the score of cleanliness, effectiveness of its sealing quality, and its positive protection against siphoning, which last named is one of the most serious obstacles to the effective operation of sewer traps in general.

Of the cuts, Fig. 1 represents an exterior view and Fig. 2 a vertical section of the trap. It is usually constructed of glass (save the metal cover), so that its condition may be inspected from time to time without the necessity of removing it for that purpose. It is specially designed by the inventor for use in connection with wash basins, bath tubs, kitchen and pantry sinks.

Referring to Fig. 2, the trap will be seen to consist of an outer vessel of cylindrical form, provided above with a brass or metal cap, through the center of which the inlet pipe passes. This inlet pipe is provided with a female screw coupling to screw directly upon the outlet pipes of the wash basin, etc., and provided below with a neck, to which, with the aid of a proper coupling, the outlet pipe leading to the sewer is attached. Inside of the outer cylindrical cup is a smaller one, suspended within it by means of metal clamps, and into which, almost reaching its bottom, the inlet pipe from the fixture to which it is attached is made to project. From the side of this inlet pipe a small tube projects, just above the inner bowl. This is provided with a gate or cover, held in place by a double hinge, operating automatically.

The operation of the device is substantially as follows: The waste water enters the trap through the inlet pipe, discharging itself into the inner cup, overflowing from this into the annular space between the outer and inner vessels, and then passing off through the outlet pipe to the house drain. The course of the waste water is indicated by arrows in the sectional cut, Fig. 2. The shape of the apparatus is such that siphonage will be rendered difficult; but to guard against the possibility of such an accident, the valve in the inlet pipe, before referred to, is provided. So soon as any notable difference of pressure is manifest from the sudden injection of water into another trap on the same line, the hinged cover opens, and air enters, producing an immediate equilibrium of pressure.

Fig. 3 represents a form of the apparatus made of metal, and intended more particularly for use in connection with bath and wash tubs. The body of this variety of trap is of tinned malleable iron, and the arm on top is of brass, working on a swivel, with a lock nut under the cover, whereby the trap can be placed at any desired angle.

The maker presents a large array of claims to excellence for this device, from which we cull the more important: The closeness of the trap to the utensil; the readiness with which it may be removed from the utensil by uncoupling; its cleanliness, derived from its scouring qualities; the small amount of water needed for cleansing; the impossibility of any sewer pressure to force any gas through the water seal, and, as a corollary to this, the impossibility of the loss of the seal by siphonage or evaporation.

The Pietsch trap, as above noted, has been tested lately by the Brooklyn health authorities, who made a very flattering report upon its merits, and, as a consequence, it is now entered on the list of traps which are permitted to be introduced in plumbing work in that city. The judges of the American Institute exhibition likewise awarded it the medal of superiority in the class to which it belongs, for the years 1883, 1884, 1885, and 1886.

DESIGN FOR A BANK BUILDING.

Excavating in Frozen Ground.

It is often necessary to make excavations for pipes in very cold weather, under which conditions the operation is difficult. The trouble due to frost can only be remedied by thawing out the surface.

The *Elettricita* says that quicklime has been tried with success. The surface where the excavation is to begin is covered with alternate layers of lime and snow. The lime becomes slaked, and heats the soil so effectually that after ten or fifteen hours it can be dug up with the greatest ease, even where the cold is excessive. Where there is no snow, water can be used.

THE Master Builders' Association of Boston have bought the edifice Nos. 164 to 170 Devonshire Street, in which their rooms are located, paying for the same the amount of $250,000. The building is a four story granite structure. The association proposes to add two or three stories more to its height as soon as the leases now existing expire, and then make it a first-class office building, with opportunity of enlarged accommodations for themselves. The property adjoins the Equitable Life Insurance Company's building, and runs through from Devonshire to Federal Streets, covering 6,662 feet.

Caen Stone.

The general character given of the Caen stone is that all the beds are of the same quality, and all equally adapted for building purposes; but evidently, from the information which I collected on the spot, and subsequently in London, there are modifications in each bed, as may be reasonably supposed, and as experience teaches us in the quarries of other oolitic stones in Bath and Portland. Various veins traverse the beds in all directions, and have a white appearance. This white substance is equally hard with the stone itself, and if a stone be laid with its bed parallel with the direction of these veins, it is of little consequence, but they, of course, indicate a certain unsoundness or division in that part; and if the stone be laid with this vein in a vertical direction, the block will run the chance of being fractured by a weight, or, if near the surface, it probably may admit the wet. These veins are not like those in the Bath stones, which are hard, consisting of crystallized carbonate of lime, and running always in a vertical or inclined direction, and not liable to separation. In general, it is considered that the blocks of Caen stone may be placed in construction in any direction, except when the white veins are perceptible. It is said that the most experienced eye can hardly detect the different qualities of the stone in the block when once they have been removed from the quarry, as the action of the quarryman's tool on the surface hardly offers any indication, and there is no appreciable difference in the appearance of the granular formation.—*T. L. Donaldson.*

A COTTAGE AT CAMBRIDGE, MASS.

This cottage is to be erected in Cambridge, Mass., for C. B. Moller, Esq. The designs, which are by Mr. C. H. McClare, architect, Cambridge, Mass., represent a house of modern design, conveniently arranged, which it is estimated can be built for four thousand five hundred dollars.

The vestibule is roomy and convenient, and is an advantage to any house, making it warm in winter and cool in summer. The hall is large, with an alcove window, and is used for a reception room, and is connected with parlor by double sliding doors, and with dining room and kitchen by swing doors.

The parlor and dining room are connected by sliding doors, and each has wood mantels and hard-coal grates. The kitchen is large and convenient, with entrance to dining room through pantry. The second floor is reached by stairs from the hall, and contains four chambers with large closets to each, and large bath room, which is directly over the sink in the kitchen, which keeps the water confined to one corner of the house, thereby saving expense in plumbing. The attic contains two large bedrooms and large closets, and is well lighted.

The foundation is of rough stone, twenty inches thick to grade line and eight inch brick to sill.

The frame is of spruce, sheathed with hemlock boards, overlaid with resin sized paper. The outside finish is of white pine, with spruce siding to belt cornice, and plain shingles above, with cut shingles in front gable. The roofs covered with good sawn shingles stained before laying.

The inside finish on first floor (except kitchen) to be of whitewood, cherry-stained and varnished. The kitchen and chambers to be of pine, painted in lead and oil.

Floors in kitchen and bath room of three inch hard pine (rift grain), all other rooms good quality spruce three to four inch wide.

Outside painting to be as follows: Roof, creosote; front gable, dark yellow; shingles above belt course, raw sienna; siding, dark gray; all exterior cornices and trimmings, dark olive green.

To Obtain One's Bearings with a Watch.

A correspondent of *La Nature* points out the following simple method of obtaining one's bearings with a watch. Turn your back to the sun, then take out your watch and place the small hand in the direction of the shadow made by your body. Then imagine a line starting from the center of the dial of the watch and passing through midday. The bisectrix of the angle formed by this line and the small hand gives the north.

LOVE-LIES-BLEEDING.

(AMARANTHUS CAUDATUS GIBBOSUS.)

There are few annuals that give a better return for judicious care and attention than the many members of this highly ornamental genus, and more especially the forms of the kind represented in the accompanying illustration. We rarely see the amaranthuses developed as they should be, and this, we believe, is not so much the fault of the soil or the season as of the grower, who treats these choice annuals the same as others of a hardier nature. A. caudatus and the variety Gibbosus

speciosus, and a few others, if properly treated and allowed to fully develop their stems, are capable of forming pyramids five or six feet in height, hung round with the long, graceful, tail-like racemes of bright-colored stems, flowers, etc. It is waste of time to plant them so many inches apart, as the plants will not have room to develop in such close quarters. When grown in vases or isolated in light, rich soil, the peculiar character of these plants is brought out in a very striking way. They may also be used with good effect in sub-tropical beds, in company with castor oil plants, solanums, wigandias, etc.—*K., the Garden.*

Wood Carpet.

The manufacture of wood carpet is a developing industry in Chicago. There are but four wood carpet factories in the United States—one in Philadelphia, two in Chicago, and one in Racine, Wis. For several years after parquetry flooring was introduced into the United States, John W. Boughton, of Philadelphia, and L. Benedict, of Chicago, divided the wood carpet business of the entire country between them. Mr. Benedict now has a carpet factory in connection with his basket works at 40 Green Street, between Erie and Chicago Avenue, Chicago. He uses oak, maple and ash largely, though the finer woods, such as walnut, cherry, mahogany, rosewood and ebony, are worked into the finer makes. Of oak alone about 200,000 feet a year is consumed. Ash and maple are next in amount of consumption.

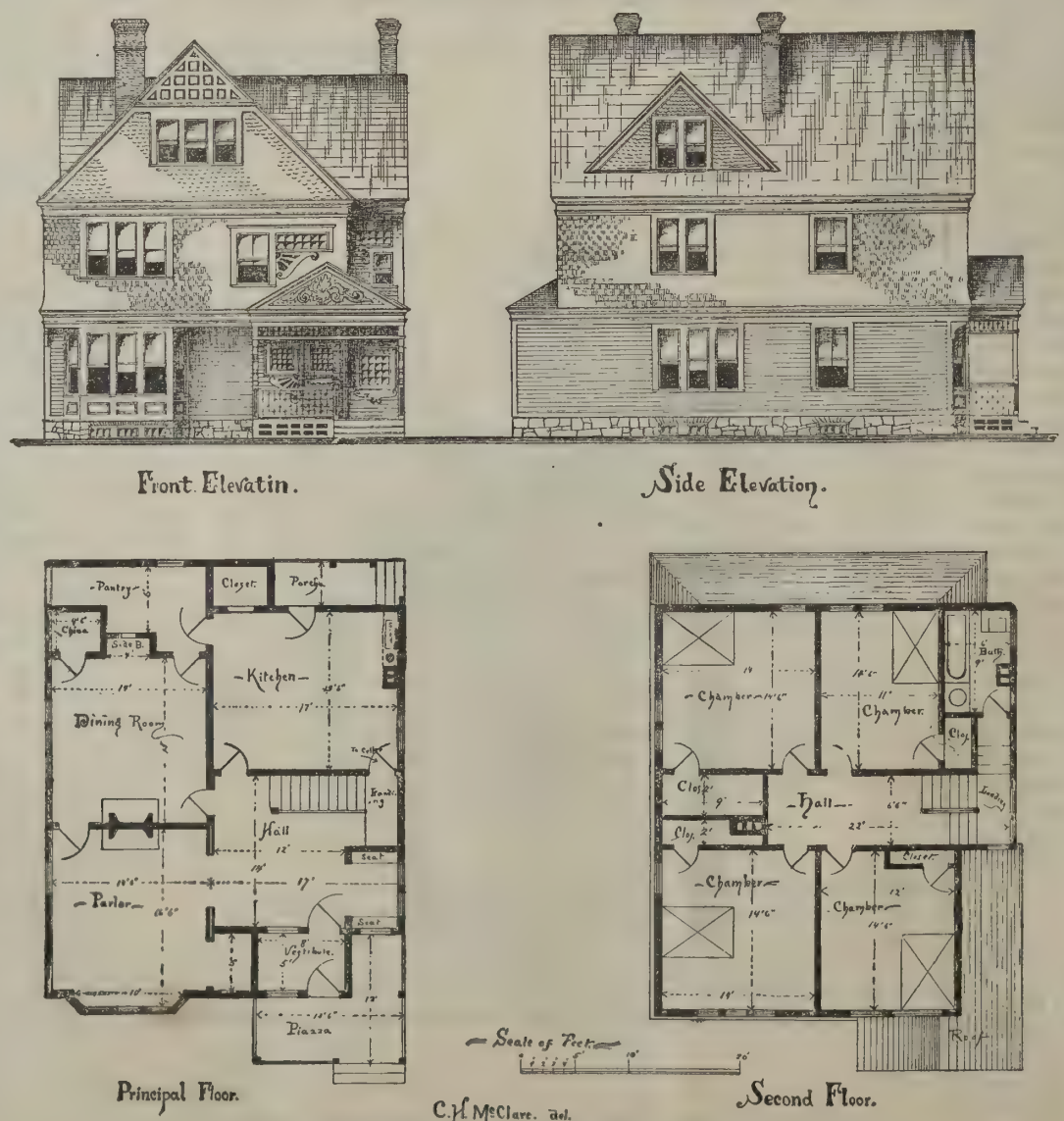
The use of wood carpet is constantly on the increase, and there is scarcely any limit to the prospects for it. This kind of floor covering can be made so as to sell as cheaply as a good quality of ingrain, or it can be so wrought with costly woods as to sell at $1 or more a foot. Good oak, ash, and maple carpet can be sold at between eighty and ninety cents a yard. Finished in oil, it is good enough for any ordinary use. For wainscoting and ceiling it is admirably adapted.

The process of making wood carpet is comparatively simple, though the work must be done with exactitude. Carefully adjusted saws strip the lumber into the desired thickness and width, the latter differing according to the work required. The stuff is then subjected to the saws that cut it out in proper shape for inlaying, to form the fabric and figure of the carpet. This must be done with much particularity, as each of the multiform pieces must exactly fit. The arrangement of the pieces and the gluing of them is done by lads, and looks like slow work, but yards are thus woven with fair celerity. Canvas is glued on one side to give strength to the fabric. The carpet is then subjected to sand paper, and is finally finished with hard oil. The designing of wood carpet is tedious and expensive. Sometimes the manufacturer devises and works out a pattern at great expense, only to find that it does not suit the popular taste, and must be thrown aside. The popularity of woods also fluctuates, as it does in interior finish. Plain white oak carpet is now very salable, because it is cheap, finishes well, and is of lasting quality.—*N. W. Lumberman.*

The Chimney Top.

A long experience in burning wood fuel in both heating and cooking stoves has brought out a danger point in its combustion that may throw light on some of the unexplained fires that from time to time occur in both city and country, and especially in the country. Being much annoyed by rain running down inside the flue, writes "Observer" in the St. Louis *Miller*, I procured a sheet iron cap for one flue and a fire clay T cap for the other. After that time I was every now and then troubled with the flues being on fire, and in several instances the roof took fire outside. After a long experience of this kind the iron cap was removed, and no fires have been in that flue or on the roof of that building.

This led to a close watch over the other building, which had the stove pipe enter into a fire clay pipe flue of six feet, ending in a T top on the outside. The fire clay flue rises through an attic. The frequency of fires led to a very careful examination into all the associated conditions. Thus I find that the colder the weather is, there is not only increased conbustion, but increased condensation of the elements of the wood carried up in the smoke, and, striking against the top cap, is retarded in its emission, and water and a tarry substance containing an inflammable oil is thrown back down the flue, and gathers on the top and around the openings of the top, often dropping on the roof. This substance is easily ignited, and the flue, the top, and the matter on the roof all burn with great force, and is a source of great and constant danger. I have tried burning zinc, sulphur, salts, etc., but all fail. Direct draught, no obstruction by caps, and frequent cleanings are the only preventives of the danger. The soot, of itself, has little or no inflammability.—*Fireman's Herald.*



A COTTAGE AT CAMBRIDGE, MASS.

AN AMERICAN COTTAGE IN LONDON.

Among the notable attractions of the American Exhibition now open in London is a shingled cottage, of which we give a drawing from the London *Building News*.

Those of our readers who remember the various examples of English country dwellings we have published will readily understand how very novel and peculiar the American cottage must appear to the British eye. But it is satisfactory to know that our English cousins seem to approve the building, and its erection in London is likely to have beneficial results

The cottage shown can be built here for about $4,500.

Industries and Handicrafts in Central Africa.

Handicrafts and domestic industries are neither numerous nor noteworthy in this part of the globe, yet a few deserve mention.

The upper Nile boats are curious specimens of naval architecture. They have no ribs, but the planks are laid one on another, and large nails are driven diagonally from both sides. They are calked with rags from the inside, and the seams are not payed with pitch; hence many leaks occur through rats pulling out the rags.

The only agricultural implement in the Bari country is a sort of shoe, shaped exactly like the ace of spades, fixed to a handle about 9 ft. long; this is pushed before the culturist as he walks, cutting the roots of the grass, and just scuffling the surface of the ground. The Fatiko hoe is similar to that used in the Bari country, but instead of being mounted in the same way, it is fixed to a short handle in such a manner that the hoe is nearly at right angles with the handle. This makes a very powerful instrument, digging into the soil for considerable depth.

In the Cazembe's country the people play on a kind of rude piano, call *marimba*.

Throughout Usmao the baobab (*Adansonia digitata*) flourishes remarkably. From its bark the people make very strong, pliable rope. In Ugara some of the streams are spanned by grass bridges, called *usisa*.

Palm oil is largely prepared in Uguha; and in localities producing china clay there are large pottery works. Rua and Manyuema turn out artistic ironwork and the famous grass or palm fiber cloth. Cotton cloth is also made at several places, and various woods and barks are utilized for particular purposes—one kind for canoes, another for spear shafts, a third for mortars, a fourth for pestles. Matting and baskets of many kinds, wooden bowls, dishes, and drums, are largely manufactured. There are also blacksmiths and coppersmiths, but most of their metal wares are procured from the Warua. They have a species of cymbal imported from this tribe, made of iron, in the shape of the letter U, and sounded by a piece of stick with a head of India-rubber.

The weapons of the Masai are spears (*omberi*), shields (*elongo*), swords (*ollalem*), clubs (*ologuma*), bows and arrows (*oluiandai, orseiyet, ombaia*), and knives (*ossirere*). They cut their own clubs from the roots of hard trees. The shield is made of ox skin, of oval shape, about 4 ft. 6 in. long, and 2 ft. wide in the middle. The hoes are made of "ebony." Formerly their spears and swords were made of hard wood, but now they import metal heads from their neighbors, to whom they are also indebted for the small metallic ornaments worn by the women, having no iron in their country, and no knowledge of working it. Their spear blades are 18 in. long and 5 in. or 6 in. wide.

In Mambwe's country, on Lake Tanganyika, much iron ore is smelted. The kilns are larger than those used by the Ajawa and Manganja. They stand about 9 ft. high, and are ft in diameter at the base and 3 ft. at the top, and are built of clay plaster 4 in. to 6 in. thick They will contain nearly half a ton of iron ore. Charcoal is used for smelting.

The Walunga are not behind other lake tribes in their industries. Excellent pottery, as well as baskets, is made in the country, and their millstones are built into a sort of solid table in one piece, with a pit or receptacle for the meal. Cotton cloth, too, is made in almost every village.

In Kairrondo the spears are long, and have short blades. The shields are made of buffalo hide, and are about 5 ft. high and 3 ft. wide. Neither swords nor knives are in use. The natives navigate the lake (Victoria Nyanza), their boats being made of planks sewn or pegged together, and sometimes provided with a sail made of *basuti*, a colored stuff imported from the coast.

There are blacksmiths in Ukara who manufacture hoes, axes, and spears. Cooking pots of clay and wickerwork baskets are likewise produced.

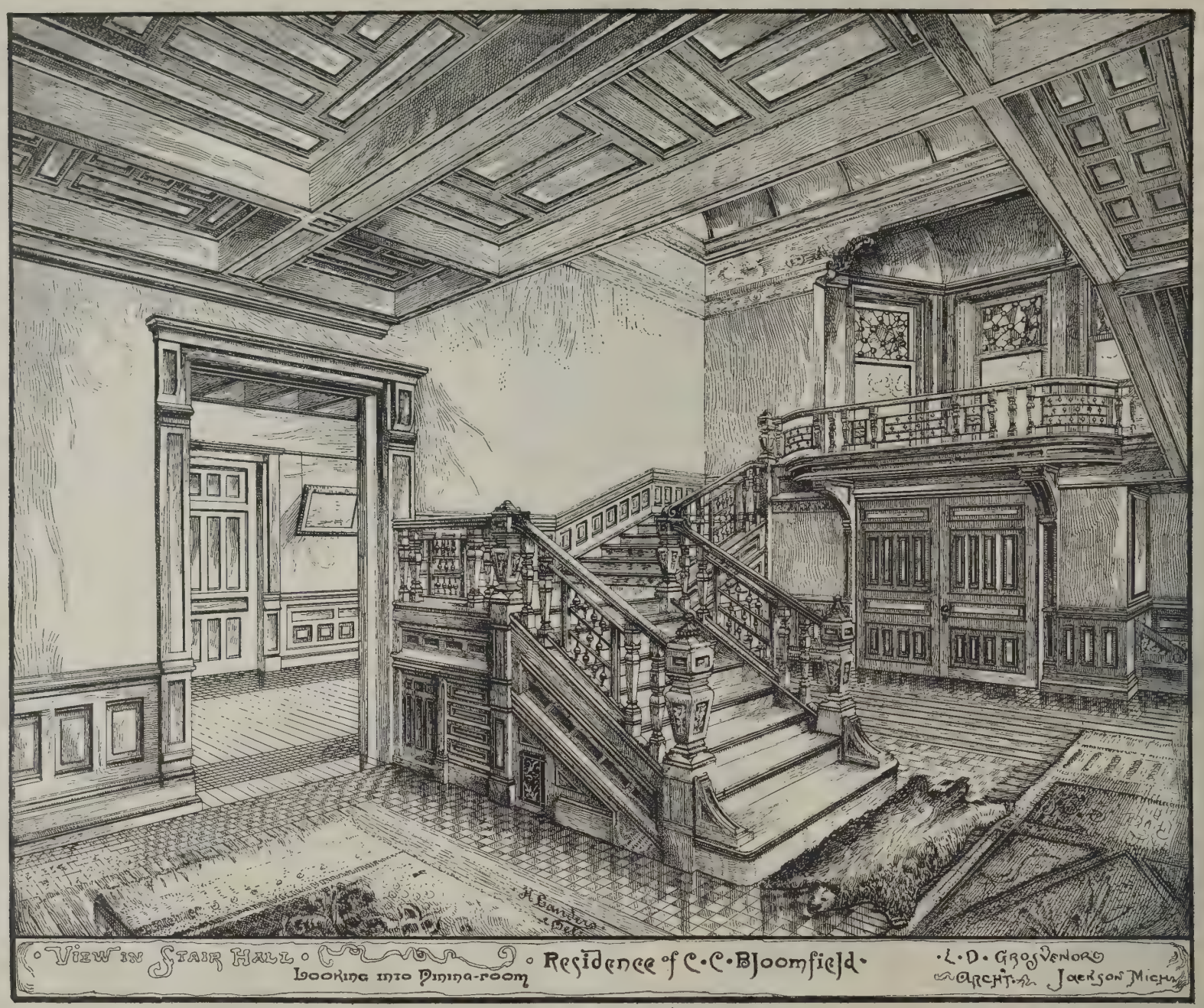
The Waganda are celebrated for their basket-work. Baskets are even used as vessels to drink from, one great shallow basket being the family drinking cup. From the inner tissue of banana stems they make napkins and pocket handkerchiefs.

The granaries of some tribes on Lake Tanganyika deserve notice. They are built on posts, with floors raised about 3 ft. from the ground, 4 ft. to 12 ft. in diameter, and the largest 20 ft. high, without including the roof Those for old corn are plastered over, and have a small hole under the eaves for access, which is reached by a notched trunk used as a ladder. Those for fresh corn are made of 11 ft. canes about 2 in. apart, with hoops of the same material every 2 ft. or 3 ft., thus allowing the air to pass through freely.

The fictile arts in the neighborhood of Tanganyika have reached a high stage of development. The process adopted is as follows: First, rough clay and water for one pot are beaten with a pestle like that used for corn, till they form a perfectly homogeneous mass. This is put on a flat stone, or in the bottom of another pot, and hollowed in the center by a slap of the hand. The workman (or rather woman) then shapes the vessel roughly by the hands kept constantly wet, smooths out the finger marks with a corn cob, polishes it all over with bits of gourd and flat wood, and ornaments it with a sharp pointed stick. After drying for four or five hours in a shady place, it is stiff enough to receive the bottom, which is worked in from another piece of clay. A pot capable of holding two and a half to three gallons occupies about forty-five minutes in manufacture. The shapes are very graceful and true, reminding one of the Pompeian amphora. The vessels are used for holding palm oil.

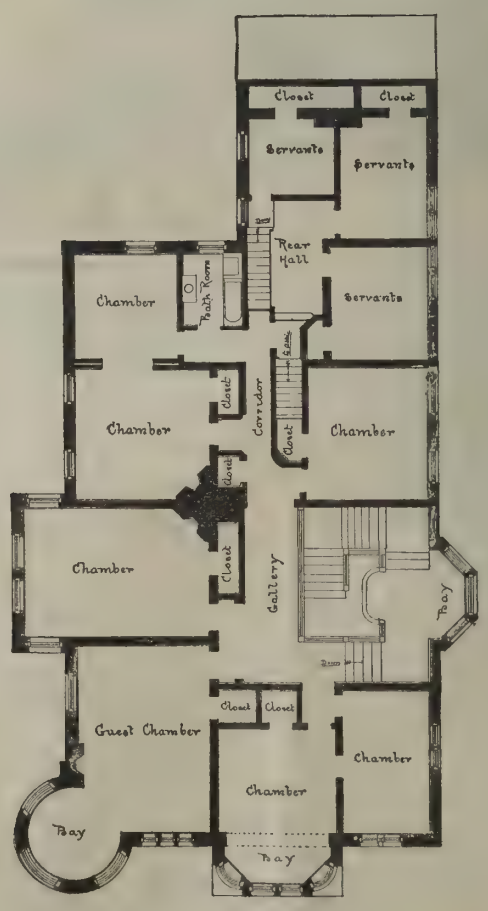
On the road between Dar es Salaam and the Nyassa country rubber vines abound, and, apparently, are but little affected, except in the immediate neighborhood of the villages, by the reckless mode of tapping employed. In many parts a native can still gather three pounds of rubber daily. Another staple of the district is copal, which is found in many parts. It seems that this fossil resin exists, even in the richest diggings, only in patches, as though it had been produced by isolated trees. The natives appear nowhere to work the country systematically, but to sink test holes, and, on finding traces of the resin in any part, to work that thoroughly. The resin now found underground, usually in red, sandy soil, is undoubtedly the produce of the same species of tree as still exists in these jungles, which now yields an inferior sort of resin; the difference between the two being the consequence of age and a chemical or molecular change effected by time. The copal tree grows throughout the Uzamaro country, and is by no means confined to the sea coast, but is even more abundant inland, beyond the first coast ridge, not, however, after the limestone formations appear.

THE YANKEE COTTAGE NOW AT THE AMERICAN EXHIBITION, LONDON.



First Floor Plan

L. D. Grosvenor Archt
Jackson Mich



Second Floor Plan

RESIDENCE OF C. C. BLOOMFIELD, ESQ., JACKSON, MICH.

Winter Palaces.

Dr. B. W. Richardson, in a recent number ot the *Asclepiad*, advocates the establishment of a series of winter palaces of health. Dr. Richardson's proposal is to erect in suitable localities a series of palatial residences of quadrangular form inclosing a large area of ground, covered in with glass, and filled with playgrounds tennis courts, sub-tropical gardens, and everything that can contribute to health and recreation of invalids who require protection from inclement seasons. The author sketches out one of these palaces of health on a certain scale. Fifty substantially built residences of two stories, to surround a square inclosure or gardens, accessible by four grand entrances. The two stories or flats would form one hundred residences, each 60 feet deep, 25 feet wide, and fitted with every convenience for the invalid, every room to be maintained at an equable temperature. Four galleries or terraces would be formed on the roofs, covered by glass, and laid out in flower beds, each gal[illegible] yards in width and 100 yards in length, mak[illegible] of a quarter of a mile. The inclosure would be also covered by a roof of glass forming an inner garden resembling the Crystal Palace. A libra[illegible]; room, concert room, theater, gymnasium, and baths would complete the idea, making it possible for the most delicate invalid to spend the severest winter months within its precincts. The suggestion of the palace of health or winter palace has been noticed with approval by the *Lancet*, which regards it as a "practicable idea," affording good work for the medical profession and encouraging native labor. The idea of Dr. Richardson has occurred to others, and has found partial embodiments in our winter gardens. The suggestion to inclose an area of park-like land, with residences on the flat system, is a vast improvement upon our hospital plan with its cooped-up yards and inter-pavilion spaces. That a large area of ground can be covered with iron and glass, and rendered equable in temperature during the winter months, and genial to the senses, has already been proved by the aerial fabric reared on the Surrey hills at Sydenham, which for more than thirty years has given pleasure to millions. The temperature maintained under this great glass roof is remarkable even in severe weather, as may be gathered by the gigantic ferns and palms that luxuriate at the tropical end of the palace. This building then affords a unique instance of an articulated structure of iron and glass that has withstood atmospheric influence in an exposed situation, and which in its proportions, grouping, and outline, despite adverse criticism, is a picturesque object in the landscape. Two of the primary conditions of health are light and sunshine, and if these elements can be abundantly provided with as little obstruction as possible, one of the great problems in the maintenance of health and vigor will be solved, and we shall have removed one of the chief difficulties in the construction of dwellings of the hospital class.—*Building News.*

[Rural New-Yorker.]

SILO BUILDING.

The silo experience of the past three years has been marked by somewhat radical changes, not only in cutting and storing the crop, but in the structure of the silo. The demand has been for a cheap silo, "a poor man's" silo, and as a result the wooden silo has come into use as a makeshift, possibly, between no silo and one of durable character. The stone or concrete silo is a structure adapted to places where sand and stone are dirt cheap; while the wooden silo is suitable for everywhere. The only question about silos of this kind is how long will they last; and those who have them say, "We have not yet found out." That a wooden silo must be a popular form arises not only from its cheapness in

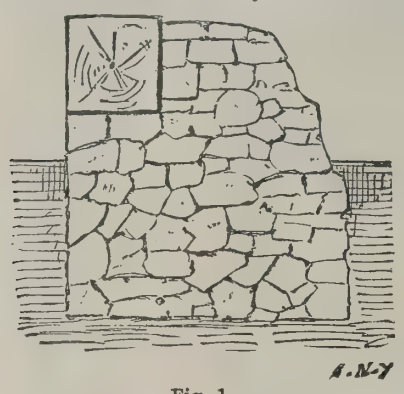


Fig. 1.

building, but from the ease with which it can be built, and its adaptation to all sections of country where stones are at a premium.

While the wooden silo may be quickly built, it must at the same time be strong, and to that end the up and down studding should be not less than 2×10 inch stuff. When the silo is being filled the lateral pressure is great, and the studding should be put not over 16 inches apart, especially if the silo has a depth of 16 feet, which is now the general rule. The frame of this structure may be wholly of 2×8 or 10 inch stuff, or it may have six or eight inch square sills, and frame bents of square six or eight inch timber, filling in between them with studding, firmly fastening them to the sills and plates.

It is always best to have the bottom of the silage pit—the floor—on solid earth, and so a good way is to build a low stone wall, firmly bedding the sill into the inside face, as at Fig. 1.

It must be borne in mind that the silo must be made air and water tight, and so this wall may be filled in so that the bottom or the floor of the silo shall come above the surface, or it may have a grout surface. As a usual thing, the soil itself makes a good enough floor. All it needs is to be pounded down firmly, come up a few inches on the inside lining of the silo, so that the air cannot work under. This is readily seen in the illustration, Fig. 2, which also shows the method of lining the silo with tarred paper and two thicknesses of inch boards nailed to a 2×10 inch studding. This makes a solid air and frost proof wall, and is easily constructed, and will last for at least several years. The first lining of boards is of rough lumber, and it is then papered with tarred board, well lapped. The second lining of boards should be surfaced on the front face, and put on with a half lap, as seen, and this makes an air-proof wall.

As it is very necessary that the foundation of a silo

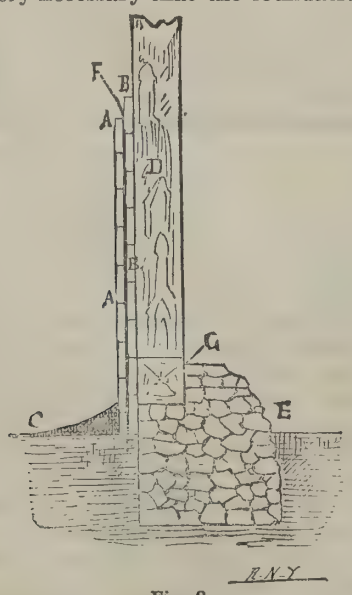


Fig. 2.

D, 2×10 inch studding, toe-nailed to sill, G. E, stone wall. G, sill bedded into wall. A and B, lining of the silo of inch boards. F, tarred paper between them. C, bottom of silo, coming up on the sides against lining board, A.

shall not spread, the method seen in Fig. 3 shows another excellent way, and the illustration plainly tells the manner of construction.

The matter of the frame settled the way of making the wall air-tight and durable is to be considered; and as good a plan for a cheap silo, and one which promises greater durability than boards or paper, is to dispense with the inside lining board, A, Fig. 2, and also the paper, and to lath and plaster the silo. The walls are first stripped up with lath on the board, B, about 16 inches apart and are then lathed in the regular way, and plastered with water lime cement, instead of white lime mortar, and smoothed up. This makes a cheap but durable wall, and one which the moisture of the silage cannot affect. The outside of such a silo—if built as a separate structure—should be covered, first, with tarred paper, and then siding. No sawdust should be used, as it is of no earthly use except to draw moisture and help rot the building. Silage cannot be frozen through the walls, and certainly not if a dead air space is made as described.

When room can be spared in the main barn, it is quite as well to sacrifice the big bay, and by taking out the floor, let the silo frame start from the ground. The studding can then be much lighter, but need to be as closely set. They can be backed against the frame of the barn, and will need no outside ceiling or paper, as the barn itself is its outside protection, and it may be built as described, or plastered, and I would, after some experience, recommend the latter, unless some kind of lumber can be found that will not decay.

In my own barn, which has a basement, the big bay was used. This gives me silos 18 feet deep, which can be readily filled from above, as the barn is built on a hill side. The doors of the silos open into the feeding stable from below. While feeding from the top, doors open on to the main floor, and the silage falls down a chute. At Fig. 4 a cross section of the barn is shown: *a* is the driveway into the barn; *b*, the floor; *c* and *d* are the silos, 16 feet deep, going down to basement floor, E. The doors out of the silo are seen, two above the floor and two below. A floor on the big beam, F, gives a large storing space above the silos.

If built out of doors, the silo needs a roof and also drainage against surface water, but protection against

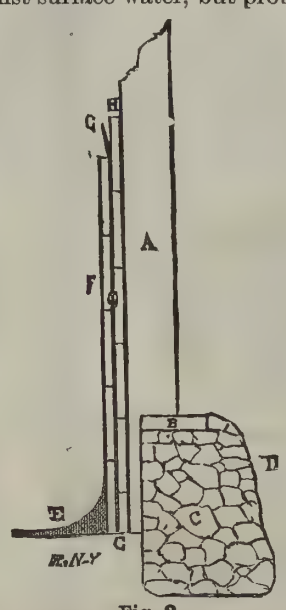


Fig. 3.

A, 2×10 inch studding cut with shoulder to fit wall. B, plank bedded into mortar into which to toe-nail the studding, A. C, stone wall. D, outside bank of earth. E, floor of silo of pounded clay or concrete mortar. F, inside lining of silo, inch lumber, surfaced. G, tarred paper, between double lining. H, inside lining of rough inch lumber.

frost is not needed, as a mass of from 50 to 400 tons of silage at 80° is its own protection, a fact that was amply proved in Wisconsin the past winter. The partitions in a silo must be well made, but I am inclined to think that where the silo is not over 14 feet in width, planks with two edges, resting in grooves at the ends, will be strong enough to hold the silage, for they can be placed in position as the silage is being cut in. After the silage has settled and becomes matted together, there would not be pressure enough to throw them over as our silo or pit is being fed out. When pit No. 2 is being fed out, the partition can be taken down a plank at a time. If this is not thought sufficient, then a row of 2×4 inch scantling can be set up with tarred paper on each side, over which siding can be put, leaving an air space between, and making a durable separation. A doorway can be cut through, and instead of doors, strips of boards can be put crosswise on both sides of the doorway as the filling progresses, and can be as easily removed when the feeding takes place.

The matter of preservation of the woodwork is of much importance. When the studdings go down to the ground, it is best to fill in between them to the depth of a foot or more with concrete made of four or five parts of sand to one of cement. This, if made thin, will act as a preservative of the wood, and exclude moisture. The facing of the silo can be either painted with a heavy coat of ironclad paint, a wash of two parts of kerosene and one of linseed oil, or a paste made of water lime cement put on with a whitewash brush—as many coats as the owner may desire. The second season, while the silo stands empty, there will be a considerable shrinkage of the inside boards, which the cement will tightly close.

It has been suggested that the wooden frame and an inside lining of boards, and then a course of hard brick up the interior, and over this a coat of cement, will be the coming silo, and with readily available lumber it could probably be built for about $1 per ton of storage capacity. I have in mind one silo that was built as described on 2×10 inch studding, and lined up with one thickness of boards On this was put tarred paper, well lapped, and the silo was then filled, and the silage kept finely. Of course, the paper must be renewed each year, but it is not out of season to say that this may be a desirable inside lining for the silo, and on a small scale might be tried.

As Maj. Alvord has said, "Silos may be built with the usual building material, and may cost from 10 cents

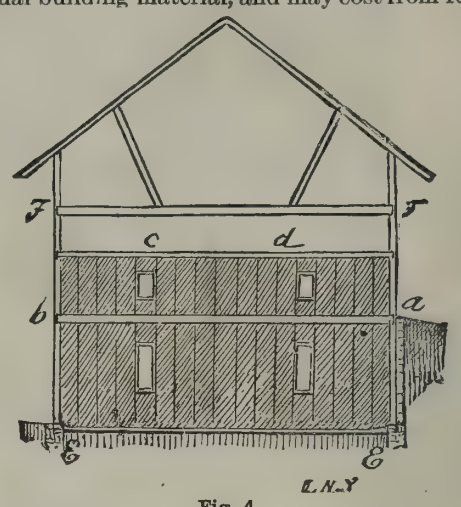


Fig. 4.

to $10 per ton, but cheaply built silos have been found to do good service." A No. 1 silo may be built for $1 per ton capacity, and will be found, for a few years at least, to answer all the requirements of a solid stone structure costing away up into the hundreds of dollars, and for this we have no less authority than Prof. Henry, of Wisconsin, who says about stone silos, "Don't build stone silos under any circumstances. Air gets to silage right through stone walls. Build of wood, with a good dead air space" John Gould.

Portage Co, Ohio.

PEDESTAL TENONER.

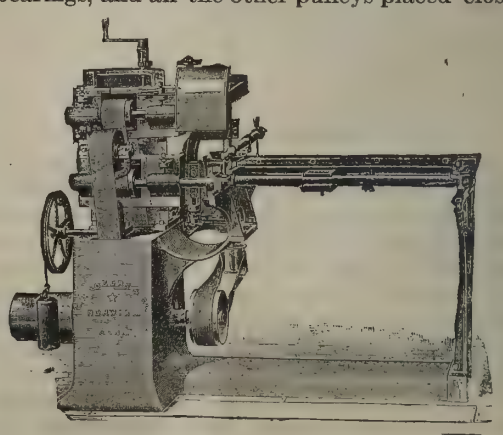
Messrs. C. B. Rogers & Co., of Norwich, Conn., the well known manufacturers of all kinds of wood-working machinery, have in this new machine embodied all of the best features of former styles of tenoners, and introduced some new and thoroughly practical ideas.

As will be seen in the cut, all the working parts of the machine are supported on a heavy iron frame, cast in pedestal form, and to which, at either side, are attached the boxes for the main countershaft. Attached to this column, and cast with it, is an arm with V track that supports one end of the carriage or table, the other end being supported by a smooth way attached to an extension of the foot or base. With this arrangement of the way the operator is enabled to follow the carriage right up, until the work has passed the cope cutters.

The cutter heads with straight cutters set for a draw cut are attached to heavy steel spindles, running in self-oiling connected boxes, to which are also hung the cope heads, the whole being gibbed to the upright.

By an ingenious arrangement, the heads are raised and lowered independently of each other, or may be adjusted together to any desired height above the carriage without altering their relative positions. The copes, being hung on the same yoke with the tenoning heads, when once set, require no further attention. They are, however, provided with both horizontal and lateral independent adjustment.

The pulleys on the cutter head spindles, as well as the main driving pulley on the counter, are placed between the bearings, and all the other pulleys placed close to



the bearings, adding much to the stability and capacity of the machine.

The arrangement of this machine is such that every necessary adjustment may be made from the operator's position in front of the carriage.

This tenoner is furnished with double head to work tenon six inches long at one cut, or single heads to cut three inches, and with one or two copes as desired.

We would advise any one desiring wood-working machinery to send for one of the new and very complete catalogues issued by this firm, which they will be glad to forward to any address.

STABLES WITH HORIZONTAL FLOORS.

The construction of our stables or stalls for the accommodation of our large domestic animals is not always such as it should be. To prevent the saturation of the flooring and the decomposition of the bedding, it has been the custom for a long time to pave the floor itself and to give to this pavement a certain inclination to accelerate the flow of water. According to this system, the pavements in the stalls often show an inclination of from three to six centimeters per meter, and often even more than this. It is to this fault that must be attributed the malformation of our cattle, the irregularity in the members, the weakness in the joints, the rapid deterioration of the limbs, and the general degradation of the race. The permanent dampness of the bedding affects the soundness of the feet of horses. The ammoniacal gases with which the atmosphere is saturated affects the eyesight and the respiratory organs. Fig. 3 offers a striking example of the sad effects pointed out. This represents a cavalry officer's charger of good breeding, but "over at the knees" and low at the withers, that is to say, deformed, and this, too, brought about by the inclination in the floor of the stable in which he was reared.

The problem of how properly to construct the floors of stables and stalls has fortunately been solved by Col. Basserie, a former member of the first committee on steeds. This system consists in an apparatus for drainage made of cast kennel stone, and sunk in the floor in a cement which is impervious to liquid. The drain is formed by being sunk under the surface, and having sides of kennel stone and a cast cover or lid. This cover has a slight longitudinal concavity smaller than the size of the shoe of the smallest horse, and having, furthermore, a series of apertures at the lowest point, made as small as possible, to enable the free flow of the water, and still made of such a size as not to catch or retain in any possible way the heel of the shoe. This type of strainer enables the liquid to flow into the drain, which can be readily cleaned, as the cover, being hinged, is readily removable. The separate drains of each stall connect with a main drain which passes along the end of the stalls, and this connects with a receiving cistern. Such, briefly, is the type of the stable Basserie

The advantages are very evident. Fig. 3, we have seen, shows an animal badly put up. Fig. 1 represents the same officer on another horse, which, although no better bred than the other, still shows much better traits, in that he was put on a horizontal floor before his growth was completed. The difference between the two types is very striking.

Already applied in over forty departments in France, the Basserie system is very highly thought of. Fig. 2 represents the interior of a stable having a horizontal floor and hygienic drainage, built according to this system at Mans, for the section general of the fourth corps of the army. A similar system should be adopted in all our cavalry stables.—*L'Illustration.*

Fig. 1.—A HORSE IN GOOD CONDITION.

Fig. 3.—BAD EFFECTS OF INCLINED FLOORS.

The Pyramids.

One of the leading granite men of the country, who has made a personal inspection of the pyramids of Egypt, says:

"There were blocks of stone in the pyramids which weigh three or four times as much as the obelisk. I saw a stone whose estimated weight was 880 tons. The builders of the pyramids counted human labor lightly. They had great masses of subjects upon whom to draw, and most of their work was done by sheer manual labor and force.

"There are stones in the pyramids thirty feet long which fit so closely together that you may run a penknife over the surface without discovering the break between them. They are not laid with mortar either. There is no machinery so perfect that it will make two surfaces thirty feet in length which will meet together in unison as these stones in the pyramids meet. They were undoubtedly rubbed back and forth upon each other until the surfaces were assimilated to each other."

Moulders' Sand.

The region around Albany, N. Y., furnishes the largest part of the moulding sand used in the United States. It is found in deposits from one and one-half to two and one-half feet deep, for four or five miles back from the river on the west side of the Hudson, as far south as Coxsackie, and on both sides of the Mohawk up as far as Schenectady. There are three grades, brass and stove castings using the finest, and bridge girders etc., the coarsest. Along the Mohawk it is shipped in bulk in cars, elsewhere mostly in canal boats and schooners; $500 per acre is often paid for the privilege of taking the sand from the land. In dry seasons it can be dug and shipped at once, but its quality is better when it is piled up and left over one winter.

Fig. 2.—STABLE WITH HORIZONTAL FLOORS AND HYGIENIC DRAINAGE.

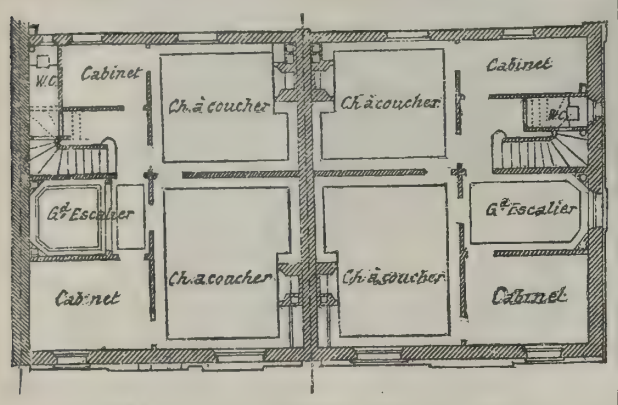
SMALL CITY DWELLINGS, PARIS.

We give illustrations from *La Construction Moderne* of a couple of small Parisian dwellings, showing the prevailing style. These are comfortable little houses. The pair could be built here for eleven thousand dollars well finished.

Measurement of Masonry.

L. D. W., of Waverly, N. Y., submits a difficult question to answer. He states that a dispute lies between a certain party and a mason as to how rough rubble or foundation masonry is to be measured; whether any allowance is to be made for corners, or whether the calculation of the work done is to be based upon the total outside dimensions.

The custom differs in different places. Should the dispute go to a jury, the verdict, I believe, in absence of a definite understanding or written contract, would be given to the mason in accordance with the custom of the locality in which the work is done.



SMALL CITY HOUSES, PARIS—$11,000.

The custom in this city and also in Philadelphia is to measure all foundation stone and "dimension stone" by the cubic foot, and all sills, lintels, base courses, water tables, and ashlar by the foot superficial and by the foot lineal, but that does not seem to be an equitable arrangement.

Now, it seems to me that where all openings are deducted, and the work is paid for by the cubic foot of actual masonry, an additional price per superficial foot should be allowed for turning corners, and that this measurement should be as many feet upon each external face of the corner as there were feet in the thickness of each wall forming the corner. On the other hand, if no deductions are made for openings, no allowance should be made for turning corners.

No one can settle a dispute in which there was no definite understanding between the parties involved. My advice to L. D. W. is to figure out the actual cubic contents of the stone work, deducting, of course, all the openings, and allow the mason for turning the corners the same price as is paid for face work to rubble masonry per superficial foot. Thus for each corner it would be twice the height of the rubble wall multiplied by the thickness of the wall, when both walls are of the same depth; but should one wall be thicker than the other, then the height of the thickest wall multiplied by its thickness plus the height of the other wall multiplied by its thickness will give the true area required. Some arrangement of that kind ought to be made, for it is certainly more expensive to turn a corner than to lay a wall straight away.

Supposing there were no openings to deduct in the problem given, the actual amount of masonry would be 2,331¾ cu. ft., and the amount to be paid to the mason on the front wall extra for the two corners would be:

$$\left.\begin{aligned} 9 \times 2 \quad \times 2 &= 36 \\ 9 \times 1\tfrac{1}{2} \times 2 &= 27 \end{aligned}\right\} = 63$$

sq. ft., and the allowance on the trench wall corners would be:

$$2\tfrac{1}{2} \times 2 \times 2 = 10 + 10 = 20$$

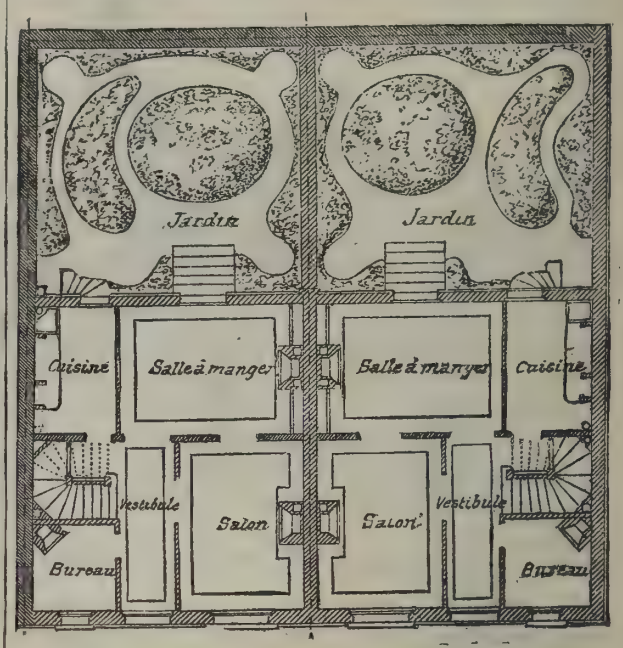
83 sq. ft.

Total allowance, 83 sq. ft. at the face work price to rubble masonry.—*C. P. K.*

Failure of Concrete Dock Works.

A matter of the highest possible importance and interest to all connected with the construction and management of harbors has been brought to light at Aberdeen. Two years since, the Aberdeen Harbor Commissioners opened a graving dock. The dock was formed of Portland cement concrete, the steps being lined with granite ashlar. A few months ago it was noticed that the concrete entrance walls, which are not lined with granite, had become swollen, and that the surface had begun to show cracks. Investigation as to the cause was at once made, and Mr. W. Smith, the harbor engineer, suspecting that chemical action was inducing the mischief, conferred with Professor Brazier, of Aberdeen University, who analyzed briquettes of the Portland cement used in the construction of the graving dock, and also samples of the concrete taken from the entrance walls of the dock. From the analysis made it appeared that the action of the sea water on the Portland cement itself, as well as on the cement in the concrete, caused an expansion and softening of the cement in consequence of the deposit of magnesia from the sea water, and also led to the formation of carbonate of lime by the union of the carbonic acid contained in the sea water with the lime in the cement. This somewhat startling discovery must necessarily receive great attention.

Within the past quarter of a century a great number of sea works have been formed of Portland cement concrete. At Aberdeen itself there is a breakwater of nearly a thousand feet entirely formed of concrete. In various ways it has required patching since its construction fifteen years ago, but the idea that its defects were due to chemical action did not occur to the harbor engineer till last year. He then mentioned the matter in a paper communicated to the Institute of Civil Engineers, the paper being printed in the first part of the Transactions of the Institute for 1886-87. The remarkable point in regard to the graving dock at Aberdeen is the rapidity of the chemical action of the sea water upon it as compared with the length of time that similar action has had opportunity of taking effect on sea works. We understand the greater effect is ascribed to the fact that the pressure of the water in the dock is much heavier than is the pressure of the water on the sea works. In the former case the pressure is from five to eleven pounds per square inch; in the latter it must be very light, except when the



SMALL CITY HOUSES, PARIS—$11,000.

waves drive heavily against the works. Till the present time there does not appear to have been any investigation as to the chemical action of sea water upon concrete.

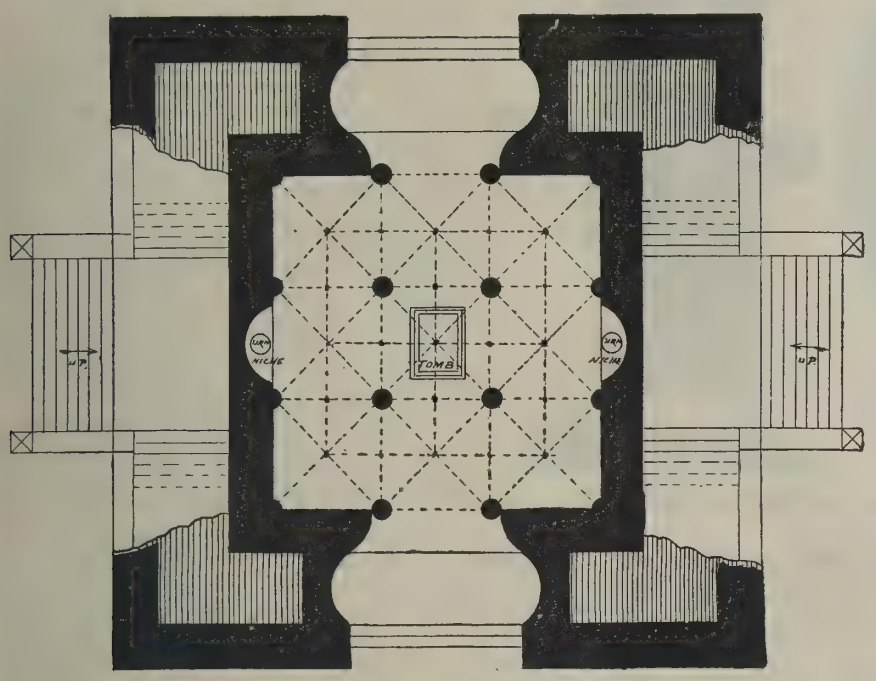
Now that science has been called in, and has made the discovery that concrete must give way before the sea, it will be the task of chemists to look out for some countervailing substance which shall prevent the decay that seems to be inevitable. It is something that science has shown the danger that is being run. It will redound more to the honor of scientific men if they can indicate the means by which the impending calamity can be avoided. The subject came before the Harbor Board of Aberdeen recently, and they resolved to hold a meeting of the whole board in committee to consider the matter.—*Dundee Advertiser.*

SMALL CITY HOUSES, PARIS—M. A. RENAULT, ARCHITECT.

MALE'S DESIGN FOR THE GRANT MONUMENT.

We present herewith drawings of the elegant design by H. A. Male, Albany, N. Y., for the Grant monument, to be erected in Riverside Park, New York. The following is a description:

Mausoleum.—Outside dimensions, 60′×60′; inside dimensions, 30′×30′, containing the sarcophagus, to which we have access through two large arched entrances opposite each other, sarcophagus and surmounting figure (an angel with palm leaves) to be made of white marble. Ceiling of mausoleum to be rib-arched and supported by pillars, as shown by plan. The monument proper to be reached by opposite terraces, three in number, as shown by drawing. An equestrian figure of Gen. Grant, with drawn sword, surmounts the whole. At the base of the column we have four arched panels containing figures representing, first (Eternal Friendship), two soldiers, representing the North and South, standing with clasped hands with their guns resting on the ground, a figure representing Peace elevated in the background about to crown them with laurel. The opposite panel representing (Strife) two figures, the North and South, engaged in mortal hand to hand combat, with the figure of Liberty elevated in the rear in an attitude of deep sorrow with her head resting on her folded arms. The right hand panel representing (Honor), Grant, standing with one foot on the White House steps, a figure representing Honor elevated in the background holding the American flag in her left hand and about to crown him with a wreath. The left hand panel representing (Abolition of Slavery) figures, male and female slaves, with their fettered hands upraised, the figure of Justice elevated in the rear about to sever their chains with her sword. These four panels to be in bronze, in bass-relief—the four corner figures representing respectively: Liberty defending her honor, the figure of Liberty standing in a defensive attitude, holding the American flag in her left hand and partially enwrapped in its folds, while her right hand contains a drawn sword. Slavery, represented by a negro slave standing in an attitude of deep sorrow, with fettered hands, and his head resting on his breast. Peace, a female figure, with outstretched arm containing an olive branch. Prosperity, represented by a female figure supporting the horn of plenty in her left hand, with her face and right hand raised toward heaven in an attitude of prayer, thanking the Lord for his grace and goodness. On each of the four corners of the second terrace we have more figures, representing Grant as a scholar, with a book in his hand, absorbed in study; as a colonel before his regiment, standing in an attitude of attention, with folded arms waiting for the bugle call; as a general, in a commanding attitude, his right hand grasping a drawn sword, with his left hand on the scabbard; as a statesman, respresenting Grant holding a roll of parchment in his left hand, about to deliver an address. These figures to be in bronze also. On each four sides of the lower base of monument there will be an inscription as follows: 1st. "Strong in spirit." 2d. "Steadfast in friendship." 3d. "Patient in suffering." 4th. "Brave in death." These mottoes to be concaved on surface of base, the letters "Gen. U. S. Grant" to be made of bronze and affixed to column. The entire structure to be of granite. Main column and pilasters to be highly polished, also inscription tablets and lower base of monument containing mottoes. Height of whole about 80 ft. Approximate cost, $500,000.



PLAN.

Figure on Front

DESIGN FOR GRANT MONUMENT, RIVERSIDE PARK, NEW YORK—BY H. A MALE.

Minute Writing.

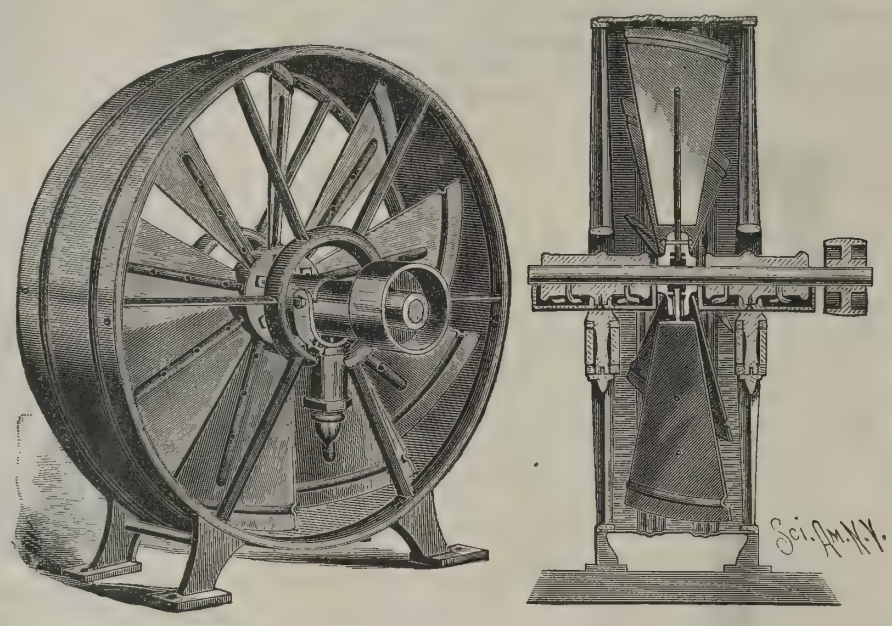
The Newcastle *Weekly Chronicle* says that Mr. Proctor has sent three specimens of his skill in microscopic writing. "One of them is the Lord's Prayer written in less than a half ring marked by a penholder smaller than an ordinary pencil ring. Another is the same prayer occupying a space slightly over the half ring. A few touches of the pen have given the latter specimen the appearance of the sun rising out of the sea. The third specimen is in some respects the most striking and curious of the three. It is the Lord's Prayer written three times over on three straight lines a shade over two and one-half inches long. The writing in this case is so straight and minute that the three lines look to the naked eye like three ruled lines. And yet, when placed under a magnifying glass, every word is seen to be perfectly distinct."—*Knowledge* (1886), p. 362; *Jour. R. M. S.*

AN IMPROVED VENTILATING FAN.

The illustrations herewith show a ventilating fan, and means for adjusting the hub thereof, by which the blades can be readily fixed at any desired angle of inclination, by simply loosening three nuts on bolts passing through the hub, thus increasing or diminishing the capacity of fan and power required. The hub is divided in two vertical sections, with opposing integral rings having a series of recesses, and a series of triangular projections with angular spaces between them, an annular recess separating the ring and projection of each section. When the two sections are united upon an axle, the flat surfaces of the triangular projections and the ring come in contact, forming a close joint, and a series of irregular openings in the edge, formed by the registering angular spaces. When the hub is slid upon the shaft, the fan rods are entered in the irregular openings, a groove in the rod being made to engage a concavity in the ring. The fans may then be given any desired inclination by turning the rods more or less to the right or left, when they will be held by the engagement of the lower portion of the rods with the ring, the two sections of the hub, when the rods have been placed in position, being held in positive, yet detachable, connection by a series of bolts.

These fans are so made as to be convenient for pipe connection, and a change of air current is readily effected by simply loosening the three nuts on bolts passing through the hub, and changing the inclination of the fan blades. The style of fan herewith shown can be placed either horizontally or vertically, the "feet" being such as can be attached overhead, on the side of buildings or partitions, or upon the floor.

For further particulars touching this invention, address the patentee and manufacturer, Mr. George P. Clark, of Windsor Locks, Conn.



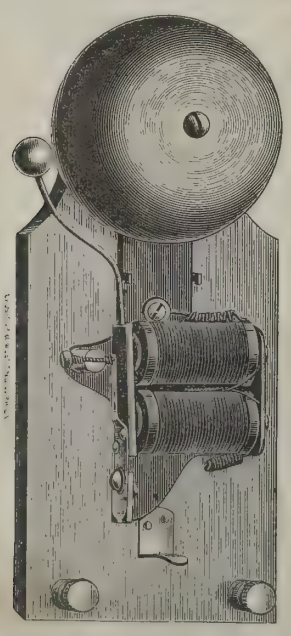
CLARK'S ADJUSTABLE HUB VENTILATING FAN.

THE SHAW & GEARY IRON FRAME BELLS.

We illustrate a new style of electric alarm bell into whose construction several features of good construction enter. The makers have been quick to recognize the weak points of ordinary bells, and have effectually remedied the defects incidental thereto in the one we now are describing.

From motives of cheapness, the frames of bells have hitherto been frequently constructed of cast iron. As this is acted on by an electric current, it acquires by induction a certain amount of permanent or residual magnetism; in electrical parlance, it becomes polarized and interferes with the action of the bell. The movements of the latter become weak and sluggish, and the addition of more battery does little to aid in overcoming the trouble. In the Shaw & Geary bell the iron parts are all made of the best Norway iron, a brand of world-wide fame for its softness and purity, and which cannot become polarized to any perceptible extent. Thus their iron frame does not at all affect the working of the bell.

The contact points are made of platinum and are riveted in place. This is a very important feature of construction, as if soldered or screwed they are liable to work loose. The binding posts are long enough to receive a double wire, and are made after the design of the English binding post. The resistance of the magnet is 3¼ ohms.



THE SHAW & GEARY IRON FRAME BELL.

The manufacturers' address is Shaw & Geary, 53 North Seventh Street, Philadelphia, Pa.

The "Alderly" and "Penn" Old Method Roofing Plates.

Much attention has, within the last few years, been aroused upon the subject of the quality of sheet tin used for roofing. Many complaints have been made as to the quality of the iron and the thickness of the coating. It was made a source of complaint that modern manufacturing methods had brought about the production of an inferior, light-coated plate.

A return to the older processes was demanded, or, at least, a production of as good material as was then on the market. The manufacturers of the above brands have met this demand. They have introduced plates probably superior to anything yet produced, and whose qualities are so accurately specified by the makers that the purchaser knows exactly what he is buying. Thus the "Penn" plate is guaranteed to contain 40 lb. of tin in every box of 20×28 sheets. The sheets are guaranteed perfectly square and flat. This introduces an element of economy, as there is no waste of metal on account of untrue shape. Special shears have been adopted in the factory in order to secure this quality. They are also guaranteed to hold all the coating possible for any plate to hold, to last longer on a roof than any other old style plate, and to be perfectly assorted. The "Alderly" brand possesses all the merits of the "Penn" plate, except that it is not so heavily coated.

Gummey, Spering, Ingram & Co., 1023 Market St., Philadelphia, Pa., are the agents for these plates.

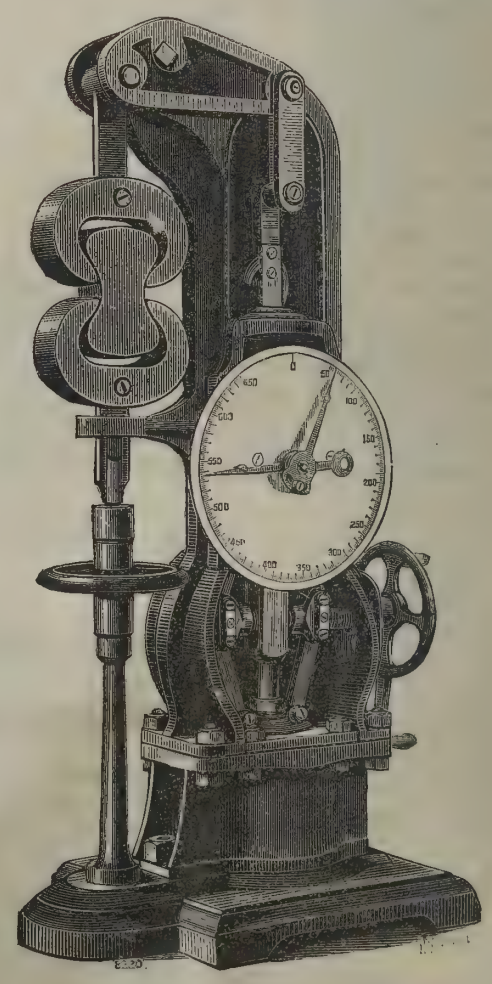
Gladstone Bricks.

Brick for the new court house being erected in Pemberton Square, Boston, comes from the yards of W. E. Gladstone & Son, Hawarden, Wales. Delivered in Boston, they cost $45.50 per 1,000. They are packed in barrels, each barrel containing only twenty-seven bricks, 9×4⅜×3¼ inches each in size. On the top and bottom of the brick there are groves 6¾×1¾ inches in size, 1 inch deep, designed to hold firmly the mortar when pressed into it. These products of an ex-premier's brick yard are warranted not to change in any manner with age, save to grow slightly darker. The process which is followed in their manufacture occupies thirty days.

CEMENT TESTING MACHINE.

The condition often imposed in cement testing, viz., that the strain shall be applied at a certain specified rate, necessitates a more regular application of the load than can be obtained by hand. In order to gain this end, various expedients have been adopted, such as using water or sand as the weight and allowing it to flow through an orifice into a vessel fitted to a lever. In more recent machines a weighted lever has been allowed to descend gradually by means of a cataract cylinder, so as to increase the leverage until the specimen broke, or a spring has first been weighted by a vessel of shot, and then the shot has been allowed to run out, relieving the spring and allowing it to exert a steadily increasing tension on the test piece. In Porter's cement testing machine, which we illustrate herewith, both a cataract and a spring are used, but the arrangement is entirely different from either of those mentioned above. On the base of the apparatus is a vertical oil cylinder having a piston in it. There is a valve which permits the oil to flow readily from the upper to the lower side of the piston, but it cannot return from the lower to the upper except through a passage commanded by a cock. On the top of the piston rod is a sliding frame on which is mounted a strong compression spring with its opposite end taking against a solid abutment. The sliding frame is also connected to the beam at the top of the machine by a tension spring, and the lengths of the two springs are so arranged that when one is loaded the other is relaxed, and *vice versa*.

Before a test is made, the piston, piston rod, and sliding frame are all raised together by means of toggle levers and a screw. These levers are pivoted to the cylinder at the bottom, and at the top bear against but are not connected to the frame. After the frame has been raised, the levers are screwed back, the oil in the cylinder meanwhile resisting the force of the spring, which has been compressed by the rise of the sliding frame. The sample briquette of concrete is then placed in the jaws, and the screw below them tightened to bring the index, which is connected by rack and pinion to the sliding frame, to zero. The valve is then opened, and the compressed spring forces down the piston at a regular speed. The extension of this spring produces an equal elongation of the tension spring which connects the sliding frame to the beam, and thus the strain is transmitted with a uniform increase to the sample until the latter breaks. When this occurs, the flow of the oil is automatically arrested, while a loose index, pushed forward by its companion, registers the strain which has been applied.

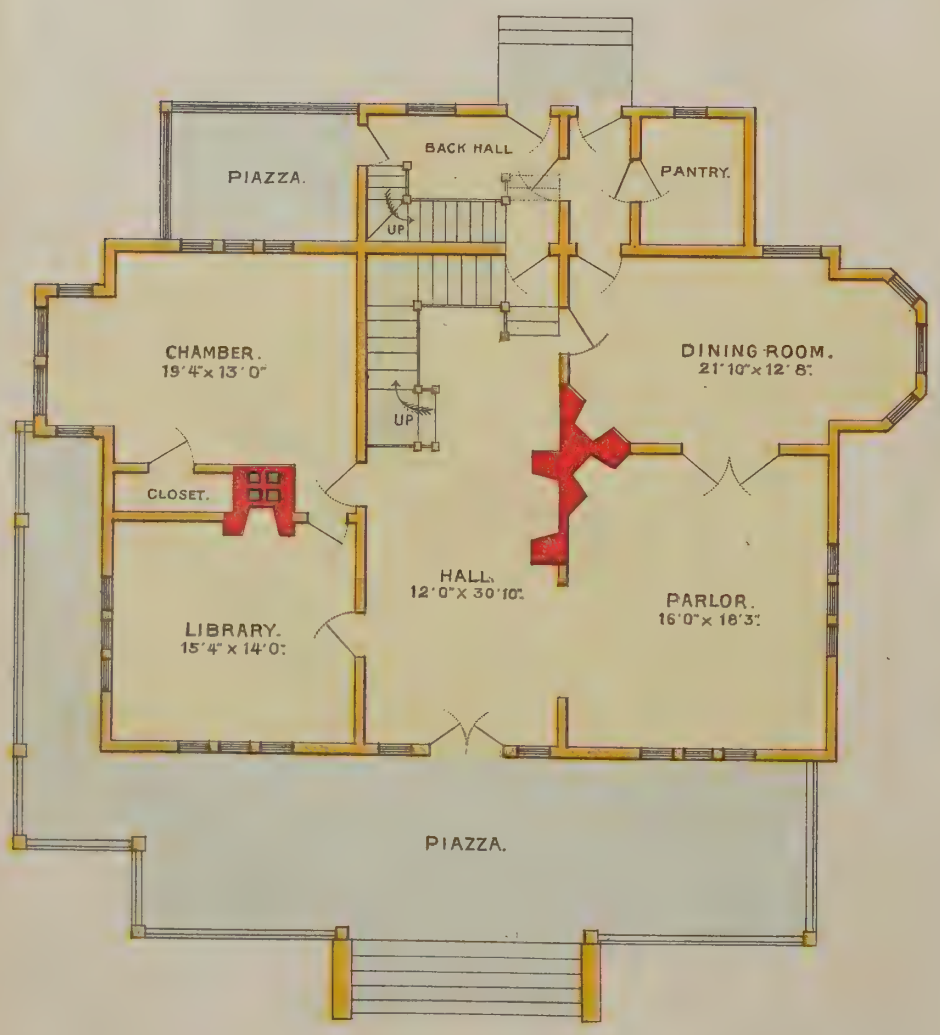


CEMENT TESTING MACHINE.

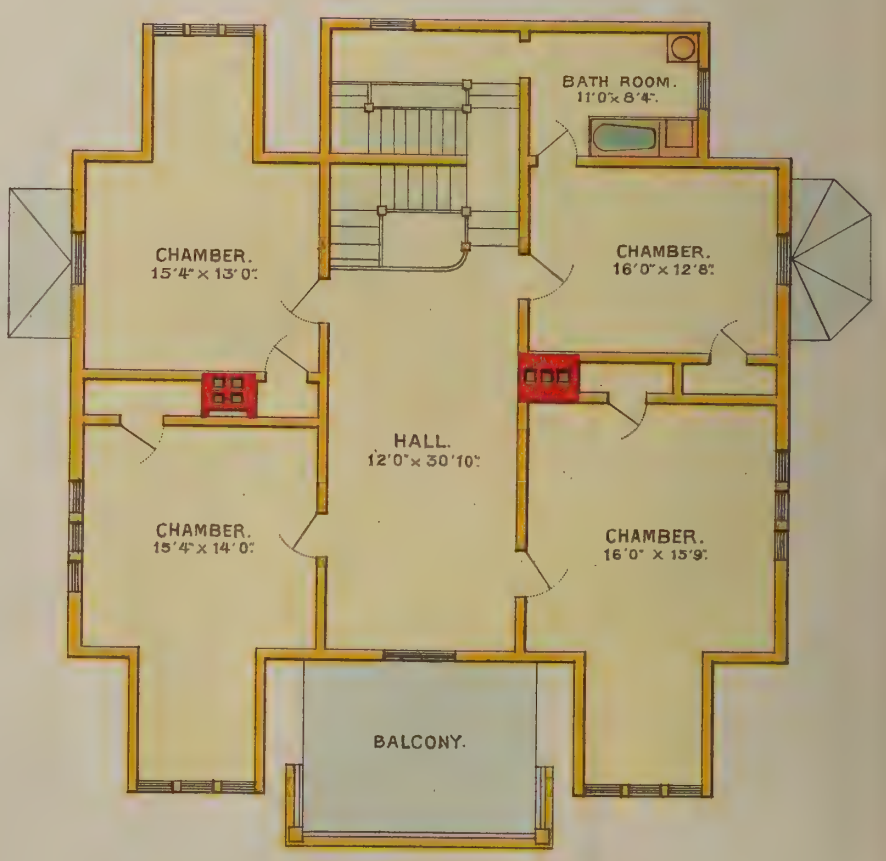
The machine, which is made by Messrs Elliott Brothers, of London, is small and compact, and by its aid a large number of tests can be made in a short time. It is arranged for briquettes of one square inch in section.—*Engineering.*

MUNN & CO. ARCHITECTS. SCIENTIFIC AMERICAN, PLAN NO. 50.

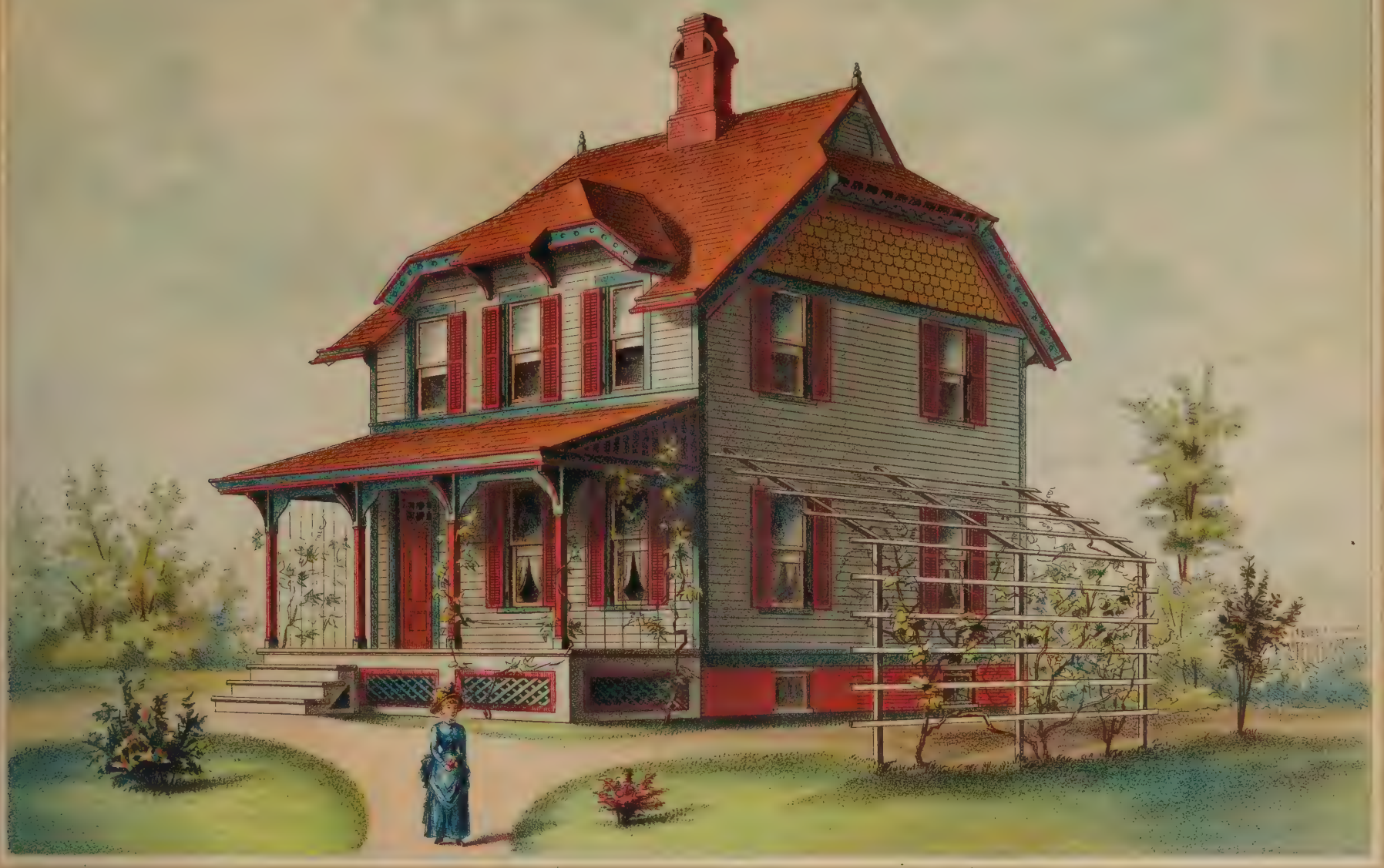
A Southern Residence of Moderate Cost.



Plan of First Floor.

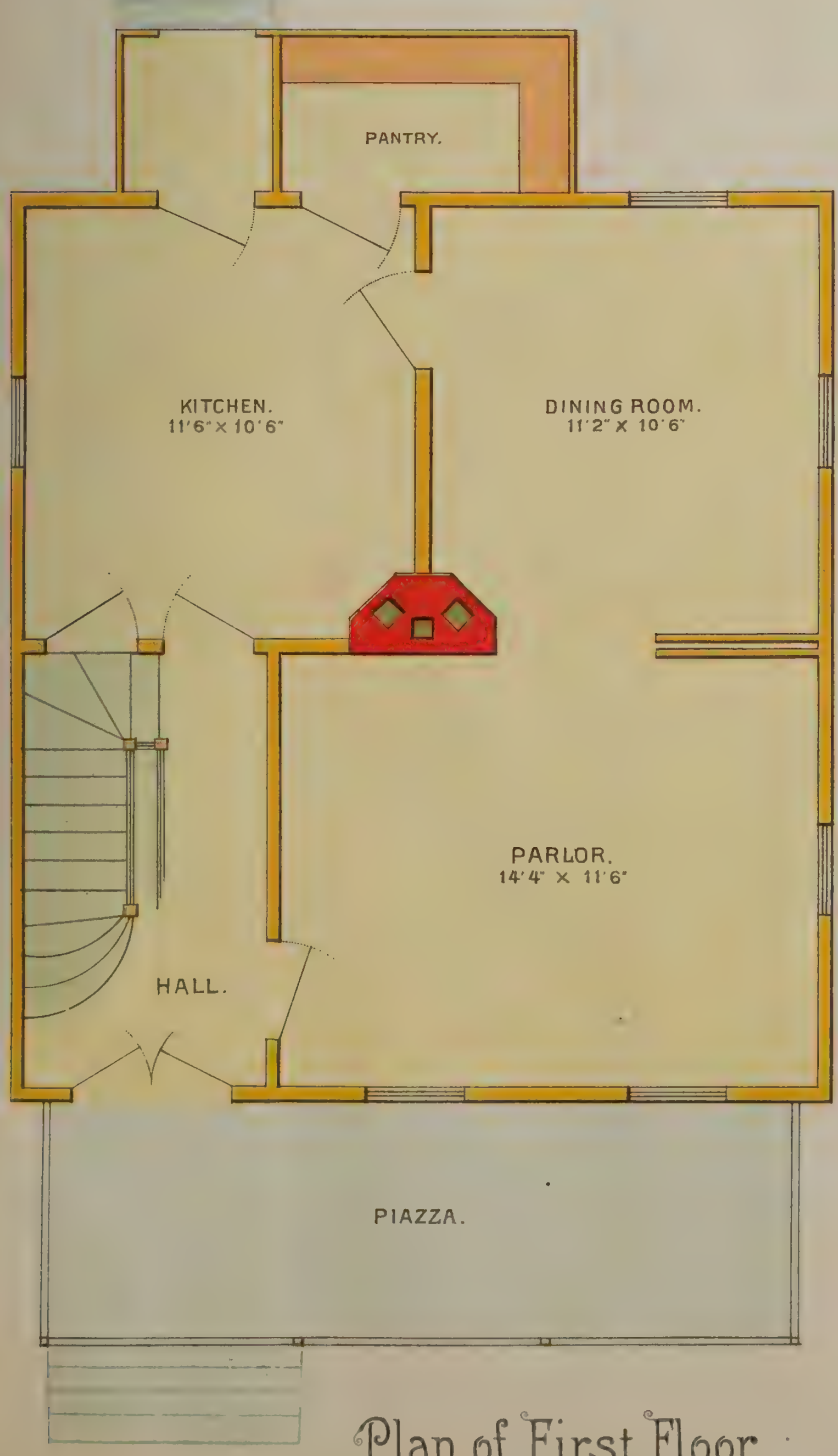


Plan of Second Floor.

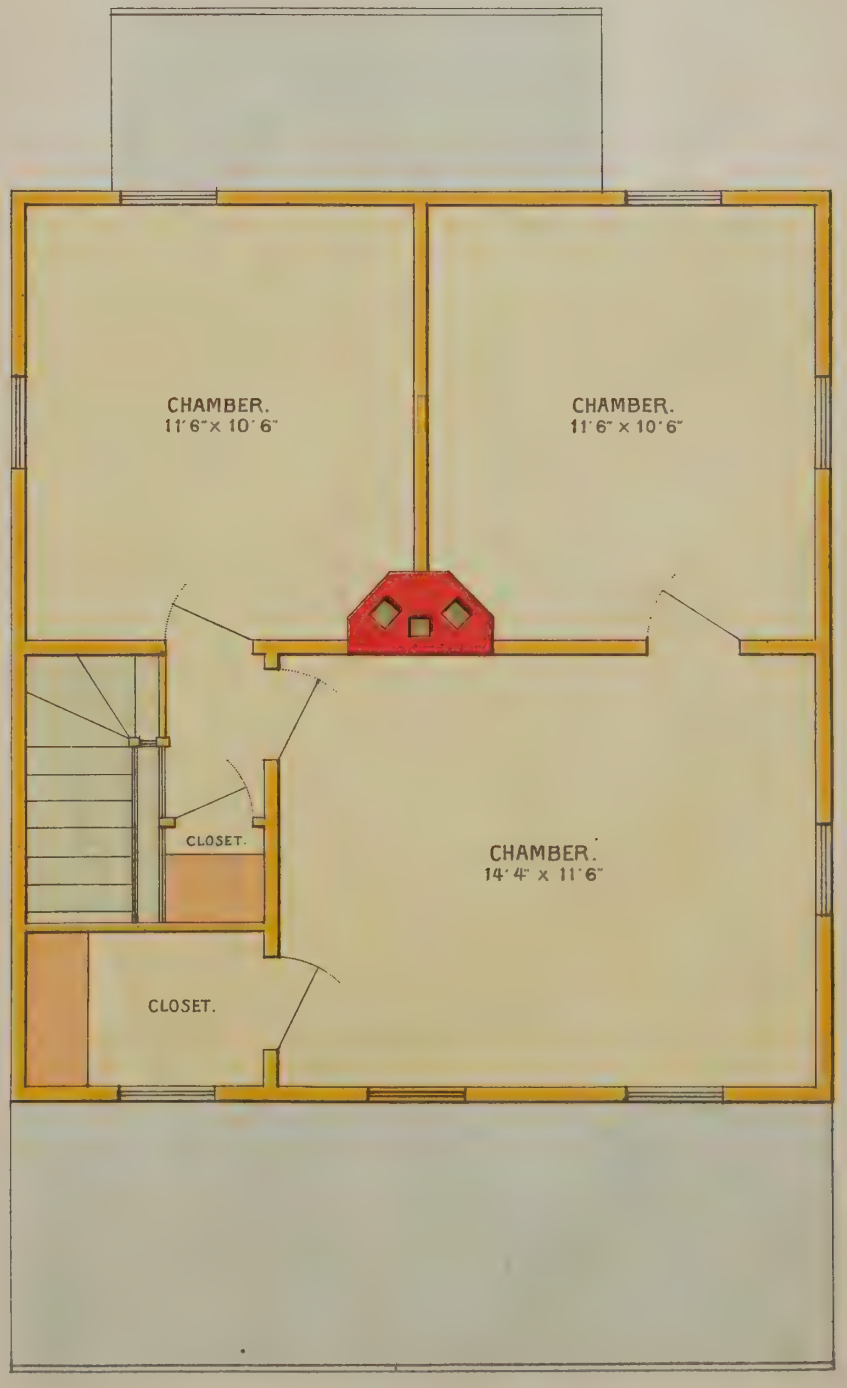


MUNN & CO. ARCHITECTS. SCIENTIFIC AMERICAN, PLAN NO. 81.

A Twelve Hundred Dollar Cottage.



Plan of First Floor.



Plan of Second Floor.

SCHUMACHER & ETTLINGER, NEW YORK.

SCIENTIFIC AMERICAN

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ARCHITECTS AND BUILDERS EDITION.

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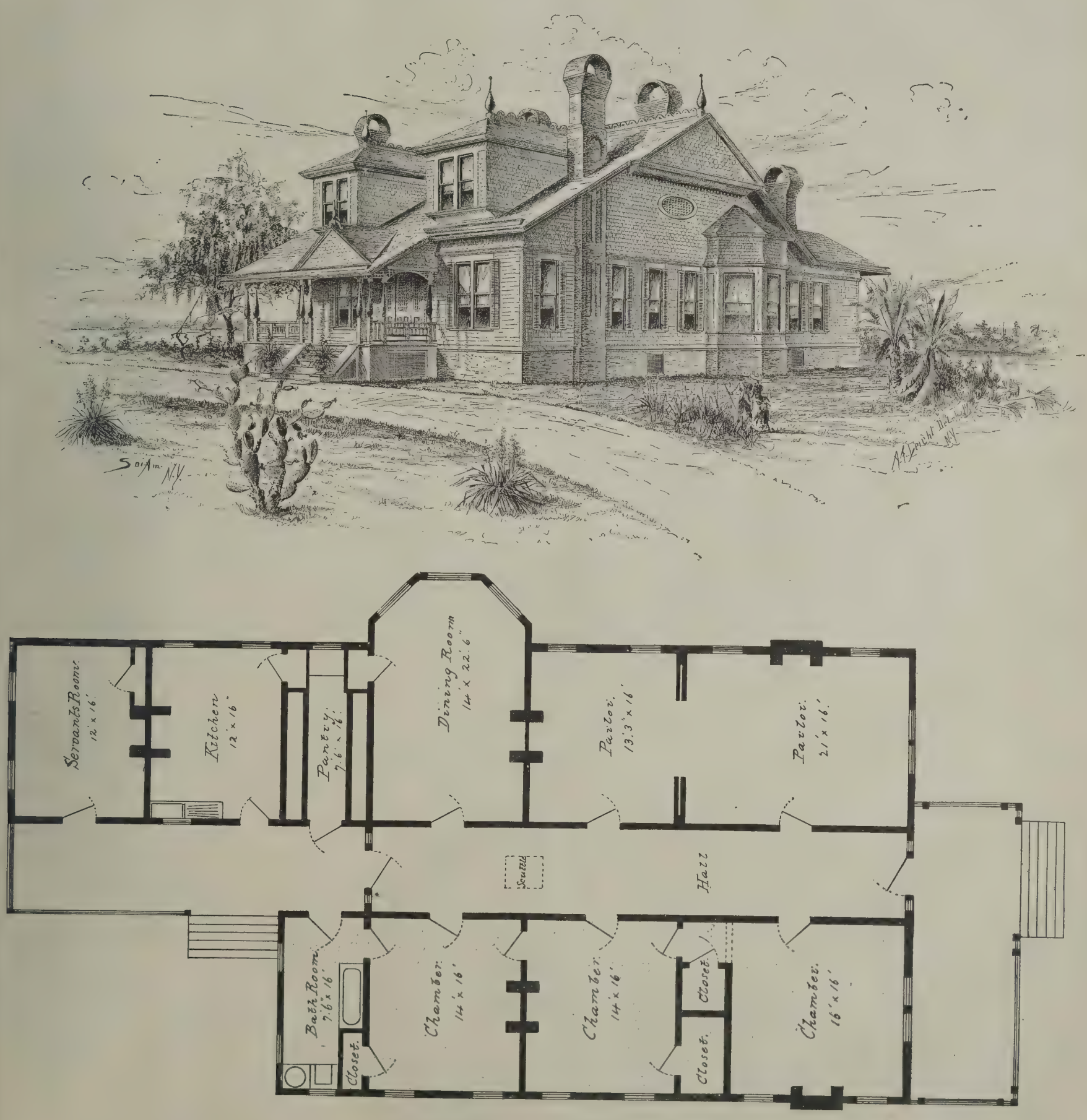

A ONE STORY SOUTHERN RESIDENCE.

[For description see page 83.]

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors,

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

NEW YORK, OCTOBER, 1887.

THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

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Those who contemplate b[illegible], or who wish to alter, improve, extend, or add to existing buildings, whether wings, porches, bay windows, or attic rooms, are invited to communicate with the undersigned. Our work extends to all parts of the country. Estimates, plans, and drawings promptly prepared. Terms moderate. Address Munn & Co., 361 Broadway, New York.

CONTENTS

Of the October number of the ARCHITECTS AND BUILDERS EDITION of SCIENTIFIC AMERICAN.

(Illustrated articles are marked with an asterisk.)

CONCERNING AGENTS.

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MUNN & CO., Publishers,
361 BROADWAY, NEW YORK.

A RESIDENCE OF MODERATE COST.

One of our colored plates this month shows a residence designed for erection at the following cost:

Mason work and all excavation	$3,300.00
Carpenter, painting, tinning, slating, all complete	7,300.00
Plumbing complete	650.00
Heating complete	400.00
Mantel pieces, etc	600.00
	$12,250.00

The following is an extended abstract from the specifications, and covers the most important features.

MASON WORK.

Excavations.—The cellar is to be excavated to an average depth of about 2′ 6″ below the natural grade. Trenches for all exterior foundations to be dug at least 3′ deep, and all excavations that are necessary to carry out the plans, such as drains, piers, steps, vault, and other foundations to be well and faithfully done. The earth to be filled in and packed against the cellar walls after the mortar is dry, and level with the bottom of the underpinning. Also trench under foundation walls and interior walls and piers.

Drains.—All drain pipe to be of best quality glazed tile; size from leaders 4″, to cesspool 5″. These pipes to be properly graded. Make all joints clean and tight, of Portland cement, and make perfectly smooth on inside of same. Run a 5″ line from inside of cellar wall to cesspool. Run a 5″ line from cellar bottom to nearest outlet. All 4″ drain tile from leaders to connect cellar drain.

Vaults.—Build privy vault where directed, with hard burnt Jersey brick, 8″ thick, 3′ deep in the ground, and leveled up to a grade 4′ 8″ by 6′ in the clear. The whole inside, including the bottom, to be tightly cemented and made water tight.

FOUNDATIONS AND STONEWORK.

Footings.—Footing to be laid under all walls and piers, both stone and brick. All footing courses under stone walls to be of concrete 4″ wider than the walls resting thereon and 4″ high; well bedded in the top of this footing course, to come level with the top of cemented cellar bottom.

Foundations.—All footings, piers, foundations, and stone walls to be built to correspond with the sizes marked upon the plans. The stone used in the foundations to be of approved medium size stone, the lower courses to be laid with extra large, flat stone; all to be carefully bedded on their broadest faces; all laid in water lime mortar, composed of one part water lime and three parts coarse, sharp sand, each layer well filled and flushed up on both sides and firmly bound together. The foundations for steps, porch, piers, etc., to be built as above, and to extend at least three feet below grade. All the foundations for outside piers to be solid concrete and slightly taper from bottom up. The stone wall coming against the earth to be well cemented on the outside. Run a line of 3″ unglazed tile all around foundation and to grade to cellar drain.

Stonework.—All face walls above grades to be laid with approved quarry stone, with vertical and horizontal joints. All to be carefully set and bedded on their broadest faces, well bonded together and backed with stone of same quality. All well laid in water lime mortar, as above specified, and cleaned off. The face stone to be pointed with red mortar made in the best manner, and cut joints on the outside and flush pointed on the inside with cement mortar. The foundation wall to run to top of the floor beams.

Cut Stonework.—All manner of cut stone represented on the drawings to be of regular broken ashlar, free from flaws and other imperfections, laid in cement mortar and pointed with red mortar. Also furnish all necessary cut stone for cellar windows and cellar door and sills coming under windows on high broken ashlar.

Brickwork.—All brickwork represented by plans to be of well-burned hard brick throughout, which must be laid wet in warm, dry weather, or if laid in damp, freezing weather, the brick must be kept perfectly dry. All brick to be laid up in best and most workmanlike manner, with mortar composed of good lime and clean, sharp sand, in the proportion of two of sand to one of lime, or of such other proportions as shall be considered desirable. All piers and walls to be built as represented by plans and of such dimensions as marked thereon.

The chimneys to be built and carried up as represented by the drawings, with good hard burned brick, laid in mortar as above. All flues to be struck joints on the inside and left free and clean on the completion of the work. All chimneys to be topped out as per elevations, with pressed brick. All the fireplaces throughout first and second stories to be pressed brick.

Bluestone.—Furnish and set in kitchen a rubbed bluestone shelf and hearth, to be the size as marked on the plans. Turn trimmer arches to all fireplaces.

Plastering.—The walls and ceilings of all the rooms and apartments where shown must be lathed and plastered with two good coats of sand, lime, and hair mortar, brown finish, and scratch coat an additional coat of white hard finish composed of best hard finish lime and plaster. All lime must be thoroughly slaked and made up at least eight days before using in the building. The whole job of plastering done in the best manner, and all repairing and patching, to leave the work in perfect condition, must be done at the completion of the building. The under side of all staircases to be plastered where required by the plans. All exposed plaster corners to have rule joint.

Plaster Cornices.—All the principal rooms and hall on first story to have cornice 8″ × 10″ as per detail, which will be furnished. Also set and furnish center pieces in each of said rooms, to cost $3 each.

Cellar Bottom.—The cellar bottom must be leveled off, pack and settle it thoroughly, and cover it flush and smooth with cement concrete 3″ deep, in three parts of clean, coarse, sharp gravel and one part paste and cement, and the entire surface to be flushed up even and true, around the sides of the main walls or gutters, sufficient to carry all the water to the drain. Over the mouth of the drain place an iron strainer, and leave the whole job of work in perfect order.

Cesspool.—The cesspools will be built after the Waring system. All information must be ascertained from parties putting in same.

IRON WORK.

All manner of iron and blacksmith work necessary to make the whole job of work complete to be done and finished in a satisfactory manner, subject to the approval and direction of the architects.

CARPENTER WORK.

Timber and Framing.—First floor joists, 3″ × 10″, 16″ from centers; second floor joists, 3″ × 10″, 16″ from centers; third floor joists, 2″ × 10″, 16″ from centers; ceiling joists, 2″ × 8″, 24″ from centers; rafters, 2″ × 8″, 24″ from centers; hips, 2″ × 8″; partitions, 2″ × 4″, 16″ from centers; bearing partitions, 3″ × 4″, 16″ from centers; door studs, 2″ × 4″, doubled; wall plates and ties, 4″ × 6″; bridging, 2″ × 2″; sleepers in laundry, 2″ × 4″, chestnut; girders, 8″ × 10″; sills, 4″ × 8″; posts, 4″ × 8″; girths, 4″ × 6″; valleys, 3″ × 8″; ridges, 2″ × 10″; piazza sills and bearing timbers, 4″ × 8″; piazza floor beams, 2″ × 8″, 20″ from center; balcony beams, 2″ × 10″, 16″ from center; collar beams, 2″ × 8″.

The girders will be kept flush with top of floor beams. Spike a 2″ × 4″ piece on each side of girder to rest floor beams on, and spike well thereto, and all other necessary timber required throughout the building, to be good, sound spruce timber, well seasoned, sawn true and square, free from sap, shakes, dry rot, or other imperfections. And all timbers used throughout must be prepared and framed according to the plans, sections, and details. All joists to have the crowning edge placed upward and sized to proper widths. Also prepare and size all studding, etc., cross bridge all joists at distances not exceeding eight feet apart. All trimmers and headers must be framed double, and in no case allow less than four inches between chimney breast and trimmers. The studding may be of hemlock.

Wood Lintels.—The carpenter must provide and set all wood lintels of every kind and description for all windows, doorways, and other necessary places. All lintels to have a bearing on walls of at least four inches on each end.

Partitions.—All partitions throughout and set building to be set according to the plans. Bearing partitions on first floor must foot upon the girders below and be capped on second story with plate for the reception of

the joists. Bearing partitions on the second floor to foot upon plate. The studs at angles to be thoroughly spiked together before being placed in position. All doors to be trussed over the top thoroughly and substantially. All partitions to be set to a straight edge. Joists in all cases to be doubled up under all stud partitions. Grounds put on for finish throughout the building.

Cutting for Pipes.—The carpenter must do all cutting for pipes of all kinds, using care not to cut off or weaken supporting timbers, and furnish all necessary pipe boards for the plumber to screw his pipes to.

Sheathing—The building to be sheathed on the outside with sound, match ⅞″ hemlock boards, not to exceed 9½″ in width, nailed to every bearing through each edge with 10d. nails; these boards to be placed on frame diagonally.

Lumber.—The lumber to be white pine, unless otherwise specified. All inside finishing lumber to be clear and dry, free from sap, shakes, or knots, pitch, etc. Piazza columns to be whitewood. The bath room and water closet fittings will be of cherry.

Exterior Finish.—All of the exterior finish for corner boards, window and door casings, cornices, water tables, verandas, bands, sidings, and all manner of finish shown on plans and details to be composed of clear white pine, well seasoned, and primed as soon as put up. Shingle the vertical sides where shown on the plans with 6″×18″ pine shingles, laid not more than 5″ to weather and cut to pattern.

Furring Strips.—Do all necessary furring of every description. The walls in laundry will be plugged and properly furred off ready for lathing. Ceil the underside of back piazza with ⅞×3″ strips planed pine, kept ⅛″ apart, no tongue and groove.

Roofs.—All roofs to be covered with rough hemlock boards 1″ thick, with good square edges, and of even thickness. All of the rough carpentry necessary to form the projection of eaves, as required for all cornices, gutters, etc., to be done in accordance with the plans and details. All to be composed of good, sound lumber, and put on in a good, substantial manner. All roof boards to be well nailed with 10d. nails. Joints broken at various places. All main roofs to be covered with the best quality of Chapman quarry black slate, 16″×8″, not less than 3″ lap. All the outer edges on gables to be laid in mortar. These slates to be laid on carbonized felt and nailed on with galvanized nails.

Floors.—All floors, when not otherwise specified, to be of white pine, free from sap, shakes, black, unsound, or loose knots, mill worked, tongued and grooved, one inch thick, not over 4½″ wide. The loft floor may be 9½″ flooring. All well and secret nailed to each joist. The porch floors to be white pine, tongued and grooved, ⅞″ thick, not more than 3″ wide, and all joints to be well laid in white lead. The kitchen floor to be composed of white maple, tongued and grooved, ⅞″ thick, not more than 2½″ wide. All the floors to be composed of lumber, the best of the several kinds specified, and all well and secret nailed to every joist. Also the bath room and water closet will have maple floor, same as kitchen. The floor in laundry will be of yellow pine.

Doors.—All doors in the house, except where otherwise specified, to be made of clear, dry, white pine, free from sap, and must be in strict accordance with the drawings. Size of doors to be marked on floor plans for width, height, etc. All doors that are marked on plans as sash doors to have proper rabbets for receiving glass and suitable provisions for same with beads, etc., etc.

All necessary dwarf doors to be provided where needed for pantries, closets, wash stands, water closet, etc., paneled or battened and beaded, as the case may require. The front and vestibule doors to be made of white pine, to correspond with the sizes and dimensions given on plans. All other doors required by the plans to be made in the best manner, and of good, sound, clear, kiln dried lumber.

The sliding doors to be hung with Warner's patent door hangers, the track boxed in as per furnished directions. The double doors to have astragal joint in center, all to be well and securely done. Pockets for sliding doors to be made perfectly air tight.

Hinges.—Hang all doors throughout with loose joint butts of sufficient size to throw them clear of architraves. Butts on front doors to be of plain bronze 5″×5″, three to each door. Butts on principal rooms and hall to be of 4½″×4½″, plain bronze. All doors to have 4½″ saddles and base pins where needed. All dwarf doors throughout to have suitable butts to match other work, and all door butts to be loose pin joints. All the room and hall doors on principal part of first story to be real bronze plain knobs, roses and escutcheons, front doors to have plain bronze knobs and escutcheons and roses combined. Doors on second story and kitchen to have 4″×4″ lacquered butts and jet and bronze knobs. All other doors throughout to have plain iron butts and white porcelain knobs and escutcheons. Sliding doors to have real bronze flush trimmings. Put suitable knobs on all dwarf doors, press doors, etc. The principal part of first story to have bronze face mortise locks The main entrance doors to have a 6″ mortise lock, night latch atttachment, with three keys, and to have real bronze fronts and striking plates. All doors in principal part of first story to have a first quality 4½″ mortise lock, real bronze front and striking plates. Sliding doors to have locks with astragal fronts of real bronze and flush furniture. All small closets, presses, drawers, etc., to have suitable locks as approved. All door locks throughout to be of the best city manufacture, and all doors to have a key.

All double doors to have sliding bolts at top and bottom, and to correspond with other furniture. Front doors to have mortise bolts of suitable size and finish, to be of real plain bronze. Also put bolts on the outside doors in cellar and laundry.

Picture Moulding.—Put up 2″ picture moulding in all principal rooms and halls, first and second stories.

Window Frames and Sash.—All window frames constructed to correspond with the working drawings for same. The sash to be size as shown, and 1¾″ thick, and hung on braided sash cords, weights, and noiseless axle pulleys. All glass to be well bedded, bradded, back puttied, and cleaned off. All provided with best approved bronze sash locks and lifts. All made of clear white pine, well seasoned. The cellar windows constructed in accordance with the details for same, and the sash to be all hung on back flaps and secured with hooks and staple and protected on the outside with ⅜″ rods placed vertically 3″ apart. The dormer windows to be constructed in accordance with the detail drawings, secured in a thorough manner and proof against leak.

Glass.—The glass in front first and second stories to be French polished plate, other rooms in principal part of first story and entire second story to be 26 oz. sheet glass, the balance to be first quality French sheet double thick. Furnish and put in stained glass where shown on the plans, design selected by the owner. Allow for this glass, $1.50 per sq. ft.

Blinds.—All windows, except two bays in second story and bay in front of parlor, to be provided with outside blinds made of the best white pine, all hung on wrought hinges and trimmed with approved blind fasts. The windows mentioned above to have cherry Venetian blinds with cornices complete.

Hardware.—All hardware and trimmings used throughout to be the best of the kind specified. Furnish all necessary bronze hardware for bath room.

Interior Finish.—All to be constructed as required by the plans and details, with sound, clear, kiln dried white pine, unless otherwise specified. All put up with neat, close joints, smoothed up and well sandpapered. Base put down in all apartments which are not wainscoted. Beads to be put on all corners, the bath room and water closet to be fitted up with cherry. Panel backs under windows of first and second stories and stair platforms. All windows, including those that have panel backs, to have neat stools and aprons.

Vestibule.—The floor in vestibule will be an ornamental tile floor, selected and put in by the owner.

Stairs.—All stairways to be built where located on plans. The main staircase to be built and supported on three plank strings, the risers to be 1″ thick and the treads 1¼″ thick. Dimensions in all cases for height of risers and width of steps to be measured from the building. The space under stairs to be finished with a neat cherry panel. All stairways must be put up after the plastering is dry. The attic and kitchen stairs built as required by the plans, of a good quality of stock, to be well supported on two plank strings, to have 1″ risers and 1¼″ treads, well housed into wall string. The main stairs to be selected cherry.

Newels, Rails, and Balusters.—The newels, rails, and balusters for main staircase to be of selected dry cherry, worked in accordance with the detail drawings. The kitchen stairs to have two inch round cherry newel and rail. All cellar and outside stairways to be built on good, strong plank strings, provided with plank steps of white pine, well put up and thoroughly secured. The main newel will be 10 × 10 base, 8 × 8 shaft, turned and chamfered, main rail 3 × 3½″, balusters 2½ × 2½, square and turned; the newel on second story for kitchen stairs 5 × 5, square turned rail for same 2½ × 3½, and 2″ turned balusters; furnish and put in steps from third story to loft.

Closets.—The closets to be ventilated by means of a hollow 3″ tin tube placed in partition and running up to air space above the loft floor. Also in bedroom closets to have two rows of double wardrobe hooks, placed on beaded cleats and two rows of shelves put in across the top and back and sides where space will permit.

Kitchen Pantry.—The kitchen closet to be fitted up with five shelves on the back, about 14″ wide, shelves on each side to be of ⅞″ lumber. Put in hanging hooks in space at head of cellar stairs. Fit up butler's pantry as shown, to have counter shelf, with small doors or drawers below, as directed, and small glass doors above these lockers. To have small moulded cornice run around the top. Furnish and set all necessary hardware to make the job complete and to match that in its immediate vicinity. Closet under main stairs to be fitted up as directed, the drainer in butler's pantry to be white ash. Put small door in front of sink.

Kitchen Sink.—The sink to be ceiled up underneath with narrow beaded battens, and provided with door of same, fitted and trimmed with the required hardware.

Wainscoting.—Wainscot walls of kitchen, bath room, laundry, and water closet with beaded battens, 2½″ wide, and cap with a neat beveled and moulded cap. The bath room and water closet to be of cherry and the kitchen and laundry white maple, all to be 3 6″ high and 20″ above the fittings.

Mantels.—The mantels, either slate or wood, will be furnished by the owner and set by the contractor.

Bathroom.—Bath tub to be cased up in a good and workmanlike manner. The water closet to be fitted up with cover, seat, and riser. Hang the seat and cover with brass butts. The whole should be put together so that at any time it may be easily taken apart for the purpose of attending to or repairing the plumbing pipes. Fit up the wash bowl underneath with narrow ceiling, 2½″ wide, and provide batten door of same, properly fitted, hinged and trimmed with appropriate butts and catches. Also fit up other wash bowls throughout in same manner.

Ventilation.—Put in all chimney flues where possible, 8 × 10 ventilating registers in all chimneys and rooms not having fireplaces. Also put 8 × 10 register in kitchen chimney for ventilation.

Bells.—Put in an electric bell from front door to kitchen, also from second story hall to kitchen and from one room to girls' room third story.

Cold Air Ducts.—Build cold air duct of wide pine ceiling boards as directed by the heater men.

Coal Bins.—Build coal bins in cellar of planed and matched spruce boards, with strong stanchions, and leave small doors.

Privy.—Construct a privy of frame clapboards, corniced and have a slate roof. Furnish a panel door, one window, and seats with hinged covers complete, and 5′ ×5′×7′ high.

Tinning.—All the flat roofs must be covered with the best M F charcoal roofing tin, laid with flat seam. The gutters to be properly lined, and run the tin up under the slate or shingles at least 6″. Bring the tin over the face of the cornice and tack it down smoothly. All angles and other necessary places to be covered with tin as above, all well soldered in resin and made perfectly water tight. Leaders of XX tin put up as indicated on plans, or as may be directed, with all necessary curves, breaks, bends, etc., to carry the water from the several roofs to the ground, and connect tile drain, which will be put in by the mason.

PLUMBER'S SPECIFICATION.

Drain.—Furnish and put in where shown on the plans a 5″ cast iron soil drain pipe, to run from inside of building out to the tile drain, 4′ 0″ outside of the building.

Soil.—Furnish and connect with the soil drain in cellar a 5″ cast iron soil pipe and run same size up and out of roof at least 4′ 0″ and cap the same with the "Smith" patent ventilating cap. Use Y branches for all waste connections. All the iron soil pipes to have a coat of asphaltum. The soil pipes to have a cleaning out cap in cellar.

Calking.—All joints of all iron pipes are to be thoroughly calked with picked oakum and molten lead and screwed in position with iron hooks. All joints between iron and lead pipes to be made with brass ferrules, to be calked into iron pipes and the lead pipes to be soldered to it with wiped joints.

Boiler.—Furnish and put up where shown on the plans a 35 gallon round head, heavy pressure copper boiler, and provide with draw cock for emptying the boiler, and shut-off cocks for shutting off water from second story, and provide with circulating pipe, complete. Connect boiler draw cock with the sink waste, have a ⅝″ stop cock on supply pipe, and combined safe and vacuum valve on top of the boiler. Boiler to be supplied with a Lockwood stand.

Supply.—Tap and pay for tapping the water main and connect a ⅝ AAA supply and run to the boiler. Supply to have a shut-off cock inside the cellar wall. All pipes are to be graded so they will drain perfectly dry. Each floor to be controlled separately by shut-off cocks. Where pipes will not drain dry, put a small pet cock. Run a ⅝″ AAA lead pipe to and through cellar wall to a point where directed, and furnish and fit a stop cock both on the inside and outside of the building.

Sink.—Furnish and set up where shown in the kitchen an 18″×30″ Mott's Eastlake galvanized iron sink, with back air chamber and iron legs, and supply with hot and cold water through ⅝″ AAA lead pipe, and Fuller cocks, and have a 1½″ X lead waste pipe, properly trapped and connected with the drain, with a 2″ iron pipe to the main soil pipe. To have a cleaning cap on end of pipe under sink. Also fit in complete in butler's pantry one copper sink, 16×20, and supply with hot and cold water through ½″ AAA lead pipe, with nickel faucets and waste connection complete.

Bath.—Furnish and put up, where shown, a 16 oz. sheet copper bath tub, 5′ 6″ long, well tinned and planished. Supply with hot and cold water through ⅝″

AAA lead pipe and nickel plated combination bath cock with rubber spray. To have 1½" C waste, and properly trapped and connected with the soil. Bath to have nickel plated plug and chain. Overflow to be connected with waste.

Bowls.—Furnish and set where shown on the plan three 14" marble Italian ware wash bowls, with marble countersunk top and sub-bases 10" high. Supply with hot and cold water through ½" AAA lead pipe and nickel plated Fuller patent basin cocks, to have 1¼" X lead waste, properly trapped and connected with the soil, to have nickel plated chain and stay and plug.

Air Chamber.—No cocks to be placed at the end of a line, but the pipe to be extended so as to form an air chamber.

Closet.—Furnish and set in the second story where shown on plans, supplied with water through 1¼" pipe from cistern above, an inodorous porcelain wash out closet, with suitable size cistern. The cistern to have the flush tank attached. Supply through ⅝" AAA pipe and have cistern valve and rubber ball complete. Ventilate the closet with a 3" lead pipe connected with the iron vent. Closet cup and pull to be nickel plated and to be inserted in the seat. Closet to have enameled drip tray.

Safe Pans.—The bath tub, bowls, and closets are to be provided with 2½ lb. lead safe pans, edges turned up 2" all around, and to have a ¾" lead waste pipe to the cellar.

Wash Trays.—Supply the wash trays with hot and cold water through ⅝ AAA lead pipe and Fuller patent cocks, with flange and thimble. Provide with a 2" main waste pipe, properly trapped and connected with main soil pipe, also all necessary plugs and chains and flanges, also provide on end of pipe a cleaning cap.

Ventilation.—Every trap through the house to be separately and independently ventilated from the crown, by the same size as the trap.

Gas Pipe.—Put up the gas pipes with outlets where shown on the plans and according to the rules of the gas light company. All outlets are to be capped and all pipes tested. All side lights are to be not less than 5' 6" from floor. All drop lights are to be hung plumb.

A COUNTRY STORE.

One of our colored plates represents a country store and family flat lately erected in an adjoining town, at a cost of thirty-eight hundred dollars. We make liberal extracts from the specifications, which, with the plans, will enable any intelligent builder to duplicate the work.

Quality.—All material used to be of good quality, free from all defects impairing its strength or durability. All timber, except where otherwise specified, to be of good and as well seasoned as the market will afford, square edged and full size hemlock or spruce.

Size of Timber.—The first and second tier of beams 2×12×16" on centers. All headers and trimmers to be doubled and well spiked together. Tail beams mortised and tenoned together. The end of the beams to be cut on *slight* bevel, as indicated on the plans. The girts for trusses to be 6×8. Truss rafters, 6×8. These trusses made as indicated on the plans, fitted on top and bottom, and bolted together as shown. Bolts to be ⅝, and large square washers at each end. Put in 6×8 summer in cellar, where shown on the plans. The filling between the trusses to be 2×6, placed five spaces in the length of rafters, and let into the rafter 1", and sized to 5½", and well spiked thereto. The ceiling beams 2×6, placed nine spaces in width of building. These to be cut between truss girts and notched and rest on a 1×2 furring strip, and all well nailed. The plate will be 3×8, laid flat on wall and bedded thereto. The truss girts spiked well to plate. There will be a regular truss on the extreme end of front. The iron rod for these trusses will be ¾" iron, with large square washers on each end.

Cross Furring, etc.—The entire second story ceiling will be cross furred with 1×2 furring, placed 16" on centers and nailed in each and every nailing with tenpenny nails, and joints broken at least every sixth one. The outside walls of both stories to be furred with 1×2 furring. The second story 16" from centers, and the first story 24 on centers, and nailed in every dry joint left for that purpose by the mason. Use twelvepenny or twentypenny nails, as the case may require.

Bridging.—Bridge the first tier of beams three rows intermediate between summer and outside wall, with 2×2, cut in accurately and well nailed at each end with tenpenny nails. The second tier to be bridged with same material and same manner except located differently. Run a row between the two stair partitions, and two rows intermediate between stair partitions and outside wall. All these to be regular cross bridging.

Partitions.—Set partitions where indicated on the floor plans. The stair partitions on first story will be set with 3×4 joist, placed 16" on centers, and have 3×4 cap and run down to summer, and well nailed at each end, and bridged horizontal twice in their height. Partitions in second story set as shown on the plans, with 2×4 placed 16" on centers, and bridged once in their height horizontal, and accurately cut in, and well nailed. These partitions to have 2×4 cap. All partitions to be set perfectly plumb and straight. All door openings to be double studs, the inner one to be cut off so the door head will rest thereon. All door heads running across floor beams to be doubled, and the whole well nailed together. Also put in blocks at bottom of door studs to make end nailing for bases. Thoroughly spike all angles and corners together, and do not allow the lath to run behind.

Roof Covering.—Cover the entire roof with surfaced hemlock boards, perfectly dry, and nailed in each and every nailing.

Flashing, Tinning, Slating, Leaders, etc.—Tin the whole entire roof with 20×14 I. C. charcoal tin, well soldered and nailed. Turn up not less than 6" against the front work. Lap over large board on rear, and nail in face, and well nailed on top of scuttle frame. Work in all necessary flashing around chimneys and around the front cornice, also tin the balcony floors, well nailed on the edges and well worked in the brick work, and turned up well against bay. Line the gutters on main roof. Turned over on front edge of cap, and nailed on face. Do all necessary tinning of every description to make the job complete and perfectly tight. Also do all necessary flashing whatsoever to make job complete. Furnish and put up on rear of building two 4" leaders, round, made of XX tin, connected to *tubes*, and fastened with strong iron hooks in joints of brick wall, and connect with tile, which will be put in by mason.

Slating.—The hood in front of roof will be slated with black slate and a red slate figure in the center. These slate to be not more than 16×8, laid with a 3" lap.

Scuttle in Roof.—Form scuttle in roof where directed 2'×3', made of ceiling boards, with a 1¼ rim and tinned over on top and sides. This scuttle to have two hooks to hold it down.

Cornice, Rails, Brackets, Gutters, etc.—Form the cornice as shown on the plans, of clear, soft white pine, no sap. The columns may be whitewood, turned as shown, 8×8. The sweeps will be made of 3 pieces, 1¼, fastened together and moulded as will be shown. The filling over sweeps will be 1¼ square and 3½×3½ open spaces left between. These squares must be neatly formed. The cornice will be a 4" crown moulding, crown faced dentals, and a small quarter round planted under dentals. This cornice to be put up on all the different places as shown on the front elevations. Each side of hood will be shingled not more than 3" to the weather. No cutting. The small pediment in front of hood will be plain, and a neat rosette planted on, at least 10" in diameter. Put in two brackets under small pediment as shown. Do all necessary boxing of timber overhead; and ceil overhead with 3" narrow beaded ceiling and brake a small moulding around in the angle. The straight filling on sides will be the same pattern as that of sweeps. The top rail at bottom will be 3×4 moulded. The bottom rail 3×3 moulded. Balusters 2×2 square and turned. The filling under front window of second story will be formed in squares about 3×3 and a small rosette planted on the cornice over show window will be as shown, with fascia crown moulding, and moulding at bottom and rosettes planted on. Make the two large brackets as shown, 8" thick, moulded on face and splayed on edges. Ceil the under side of balconies with 3" narrow beaded ceiling, ⅞ thick. Put in all necessary pieces to make complete. These two large brackets must be held in place by a long bolt running into the brick wall and nutted up tight, and have a small round iron built in wall, and bore a hole in bracket to keep it from settling down. Put up the show window as shown. The sash will be made of clear soft 2" lumber in double sliding sash, no weights, but proper fastenings to hold them up. Head lights made 2" thick and to swing on top and fasten. Form transom as shown. Form moulded sill and base to show window as shown. The under part of show window will have sash to open, with rough plate glass inserted, and hung on top and fastened when shut or open. Anything not mentioned here to finish the front complete will be shown in details, which will be furnished when needed. The floors for balconies will be boarded with hemlock boards, and have a slight cant each way to run the water off. Make and lay a striped floor on each balcony 2" strips, ⅞ thick, screwed to 1¼ bearing strips, these bearing strips to be scribed to tin work, so as to make the floor level. The strips to be ¼" apart, and paint edges before laying down. This floor to be fitted neatly on each side, so it will lie solid, and made in two sections, so it can be easily taken up. Form gutters on main eaves as shown, 6" high, and small cap on top, and line inside and give proper cant to rear.

Cresting and Finials.—Furnish and put up the three finials as shown. Allow for finials $3 each. Also put up cresting and allow for same $1.50 per lineal foot. This iron work to be selected by the architect.

Window Frames, Door Frames, Shutters, Blinds, etc.—All the window frames made in the usual way. For brick work jambs, 1¼ thick. Outside casings 1¼×2, back stops ⅞ and 2" sills. Make regular boxes for weights and pockets. The first story will be arranged for sub jambs, but the second story will have jambs proper width, so they will come flush with plastering. All to have proper weights, 2" pulleys, and Italian sash cord, to be fastened with bronze daisy pattern sash locks. The upper edge of top casing on these frames will be made segment, so mason can arch over. All these frames must be primed before setting, and the carpenter must set same and protect them. The cellar frames in rear will be made as usual, for single swing sash, hung and properly fastened when shut or opened. The two windows in bay on second story, one on each side, will be made box heads, so as to permit easy access to balconies. Make the rear door frame in the usual way, wide jambs, and make top of head casing segment same as windows. The frames for front doors will be shown on details when needed. Put fascias on eaves and barge boards on rear gables.

Blinds and Shutters.—All the second story windows will have outside rolling blinds, properly hung and fastened when shut or open, painted three coats at the factory. The two rear windows on the first story will have paneled shutters in pairs, properly fastened when opened and barred when closed.

Back Stoop.—Put up back stoop; suit the grade to 1¼ treads, ⅞ risers, ⅞ floor, 4 × 4 post running from ground to proper height of rail, put rail on each side, with plain straight balusters, and ceiled up tight on both sides.

Ceiling in General.—The whole entire first story, including the ceiling, to be ceiled with 3" beaded yellow Georgia pine ceiling, ⅞ thick, clear face and smooth blind nailed. The closet under front stairs to be ceiled in same way. Also make partition between office and main store of same material. Put in small quarter round in angles of ceiling. Top of show window to be finished in same manner. The partition will have sash on right of door as shown. These sash will be properly fitted in frames, about 4 ft. from floor to sash, and the sash about 4 ft. high, made so they can be opened if necessary. The door in this partition will be a sash paneled door. The bottom of show window will be floored to the height of bottom of sash, and the front of same will be ceiled same as other part of store. The front of this to finish with nosing and cove finish.

First or Store Floor.—Lay the entire first floor with yellow Georgia pine, 3" wide, perfectly dry, clear face, and blind nailed in each and every nailing, driven up perfectly tight. Lay entire second story floor with narrow tongued and grooved white pine flooring, perfectly dry, well driven together, and blind nailed in each and every nailing. No loose knots. The first story 1⅛ thick, second story ⅞ thick.

Stairs, Rails, etc.—Build the front and back stairs as shown on the plans, the treads to be 1½" yellow Georgia pine strings, 1¼ white pine risers, ⅞ white pine nosing, and cove finish. House the treads and risers into the strings and wedge with glue, the upper edge of string to match base. The under side of front flight will be ceiled and the under side of back flight will be arranged for plaster. At the head of each flight there will be a 6" turned and square ash newel let in floor and made perfectly solid. Run a 3 × 4 ash moulded rail from each newel back to corner of wall. Insert on each side 2" ash neatly turned balusters, 5" from centers, bored in rail and dovetailed in floor, and driven in with glue. Nosing and cove finish around stairs. The risers and treads will be tongued and plowed together, with three blocks glued underneath on each tread. Put up on either side of both flights a 2" turned ash wall rail, with turned ends and supported on ornamental brackets, put on *close* enough to make strong. Build cellar stairs where shown, of 2" rough spruce planks, strongly put up and to have pine hand rail.

Trimmings, Stools, Bases, etc.—All the trimmings showing in the first story inside will be yellow Georgia pine. Set jambs for windows to be made proper width and tongued into sub casing, window stools made to lap on window sill, and finish with nosing and cove finish with apron. The casing will be 5" wide, with turned corner blocks at angles, these casings to be moulded in solid, as will be shown. All the work on the front which will show white pine in the natural way in finishing front will remain so. Furnish all necessary stop beads, etc., to make windows complete. The entire second stories and both hallways at bottom of stairs will be finished in white pine, clear and good. Door jambs 1¼, rabbeted casings, 5" wide, moulded in solid corner blocks at angles. Small wall moulding to miter around casings and base. Base 8" wide, moulded in solid. Furnish all windows with proper stools, aprons, etc. Stop beads complete.

Doors.—The store door will be made as shown, 2" thick. Hall door as shown, 2" thick, wood panels. All other doors ordinary four paneled. All clean and dry for wood filling. All to be per number and size and thickness as marked on the various floor plans, and all to be white pine and moulded. All these doors to have ash saddles. The front and store doors to be hung with 5 × 5 imitation bronze butts, three to each door, all other doors hung with 4 × 4 imitation bronze butts, two to each door, the hall door to have a 6" lock, with night latch attachments, with bronze knob outside and bronze escutcheon with bell pull to match. Furnish and

hang a 5″ gong bell in lower hall. The store door to have an improved latch handle, real bronze. All other doors to have brass faced mortise locks, except 1¼ doors. Those to have where in closets reverse bevel rim locks. Cellar door to have 6″ plain rim lock. All outside doors and cellar door to have extra bolts. Knobs and escutcheons for inside doors to be j t and imitation bronze mountings. Put on all ne essary plaster corner beads where required.

Shelving.—The two kitchen closets will be shelved five shelves high, one side of pot closet and three sides of china closet. Shelves about 14″ wide. The bed room closets will have two shelves each and hanging strips underneath. Supply these strips with wardrobe hooks. Also put up other hook strips where requested, and supply with hooks. Rubber tipped bumpers to all doors necessary.

Sink.—Furnish and fit up sink where shown, as directed, 18×30, and a No. 2 Douglas lift pump. This pump to have a 1″ A caliber supply pipe, lead, connected to pump and cistern. Also connect 1½″ B lead pipe for waste with trap under sink, same size, and run down to cellar and connect to drain tile, which will be furnished and set by mason. Carpenter to do all necessary woodwork for the plumber, and put up all necessary pipe boards.

Blocks, Furring, etc.—The carpenter to furnish all necessary lintels, arches, centers, and furring for mason, of every description whatever.

Sash and Glass, Closing Building, etc.—All the sash throughout, except cellar, to be 1½″ thick. Cellar sash, 1¼″ thick. The glass all well puttied and tinned in. All glass, except front, to be second quality double thick French sheet glass, the front, including the door and head lights, to be first quality French double thick, put in in the best manner. The building will be tightly closed up for the mason. If the sash are put in, they must be protected, and the carpenter be responsible for all the glass and make good and replace all broken ones.

Coal Bins.—Build the coal bins where shown on the plans, of 2×4 scantling and surfaced hemlock boards, with hinged door complete.

Locker.—Build the locker where shown on the plans, of 3″ strips, put ¾′ apart, and nailed to cleats with wrought nails and clinched, and to have door hung complete, with lock and key. This locker to be shelved as may be directed.

Hardware.—All the hardware to be of the best city manufacture.

Put headlight over back door, hung on top and properly fastened when shut or open.

Privy.—Build privy on ground where directed, 4′ 6″ × 5′ × 7′ high. Built of 4½ ceiling, planed on two sides and ceiled overhead. Put in floor, seat, and small seat, all to have covers, small sash to slide, and batten door. These covers to be hung with flaps, door to be hung and have lock and key. The roof to be shingled and have crown moulding for cornice. Put cover on that part of vault which projects out.

Scuttle in Ceiling and Ladder.—Put scuttle in ceiling in second story hall, 2′ × 3′, with cover complete. Make a light ladder to same, with rounds instead of steps.

Gas Pipes.—Put in a system of gas pipe outlets where marked on the plans. Side lights 5 6 from floor. Comply with the rules of the gas light company. The company will connect from the street. These pipes to be tested and made perfectly tight.

MASON'S SPECIFICATIONS.

Stone Work.—The stone wall to be 16″ thick, the height of 7′ in the clear, of cement bottom, wall laid up with good sized quarry stone, laid bonding. After floor beams are laid they will be filled in between with stone and leveled to the top to receive brickwork. This wall to have footing course of solid grouting of gravel and cement, to project at least 3″ either side of wall, and to be 4″ thick. The same kind of footing course under brick piers in cellar. Stone wall laid up with cement and clean, sharp sand mortar, one of cement and three of sand; flush point the entire inside and out.

Stone Sills.—Furnish bluestone sills for all the side and rear windows. Selected as smooth as possible. Also, same kind of sills for cellar windows. The two doors in front will have brownstone sills, 8″ thick, and wash cut in. Also furnish and set 8″ water table under show window, with 2×2′ wash cut on these sills, and water table, to be set level with top of floor. This to be fine tooled work. The back door sill will be bluestone selected.

Areas.—Build two areas to cellar windows on rear, about 2′ deep, surrounded with bluestone flags and brick bottom.

Cistern.—Build cistern where directed, 10′ deep and 8′ in diameter, all in the clear. Built of imperfect shape, hard burnt brick, laid flat in cement mortar, domed over on top, and form neck and cover with bluestone cap. Cement the entire inside with Rosendale cement and warrant perfectly water-tight. Connect this cistern with leaders with 4″ drain tile joints, well cemented together, and put down at least 2′ 6″ deep in the ground.

Cesspool.—Build cesspool where directed, 8′×8′ in the clear, about 50′ from the nearest point of building. This cesspool to be built same as cistern, water-tight. Run a 3″ drain tile from inside of cellar wall to same, made perfectly tight. Also run a 4″ drain tile from cesspool about 20′ on the low side, and turn down in cesspool. This pipe is intended to carry off the water and soak away. Both of these pipes to be at least 2′ 6″ deep.

Brick Piers for Back Stoop.—Build two 8×8 brick piers for back stoop, with foundations 2′ 6″ deep.

Privy Vault.—Build privy vault where directed, 4 ft. deep, made of stone and laid up with mortar, and cemented bottom, leveled off on top 1 ft. above ground. This to be 3′ 10″ × 6′ 6″ in the clear.

Brick Piers in Cellar.—Build the brick piers in cellar where indicated on plan, 12 × 12″, built of hard burnt Jersey brick, laid in cement mortar.

Cementing.—Cement the whole entire cellar bottom with Rosendale cement. One part cement and two parts of screened gravel, made 3″ thick and smoothed off on top, and have a slight fall to cellar drain. Make a depression about 1″ deep next to cellar wall all around.

Brick Work.—The building to be built of hard burnt Jersey brick, except front of the first story to the top of second story. Beams will be 12″ thick, balance 8″ thick. These walls laid up with sharp sand and lime mortar and a little cement. Headers every sixth course. The joints laid as close as possible, and neatly struck both sides. Build chimney flues where shown, and struck joints. Top these chimneys to the height of roof peak, and capped with bluestone caps. The windows coming in brick walls will have arches turned over with two rowlocks. Mason will assist carpenter in bedding plate. The front will be laid with pressed brick, laid close in red mortar and well joined and bonded to side walls. All the brick which is covered in front may be Jerseys. Turn arch over second story bay, 2 ft. spring, in the strongest manner. Leave dry joint in every tenth course for carpenter to nail furring to. The front to be cleaned down with acid. The rear gable will be bricked up to peak.

Iron.—The mason will furnish all necessary anchors to tie walls to floor beams; and also all necessary iron work to tie front walls to sides, furnish and put in place one iron girder to support second story wall in front. Also furnish and set two 5″ iron columns, plain, with large cap and shoe. Particular care must be taken in the foundation under these columns. The shoe to be set in cement, so as to have an equal bearing on every point. The iron beam will be bolted to a wood beam on each side with ½″ bolts.

Plastering.—The entire second story, including closets, hallways, and down stairways, back and front halls and underneath back stairs, including each side thereof, to be lathed and plastered three coat work scratch brown, and hard finished. The mortar, made of the best plastering lime and sharp screened sand scratch coat, to have plenty of long hair in, the hard finish to be gauged high. Use white sand for hard finish.

Coal Chute.—Build coal chute where shown on the plans, with round hole cut in flag walk, with iron cover This chute to be covered over on top with flags, and build up sides with brick wall. Also make bottom of brick, so the coal will slide easy, without any obstruction whatsoever.

PAINTER'S SPECIFICATIONS.

The whole exterior of wood and tin work to be painted two good coats of English white lead and linseed oil, of such colors as may be selected. The priming to be done immediately after the work is put up. Putty up all nail holes after priming is done. Shellac all sap, knots, etc., before priming. All tin work painted two coats of Prince's metallic paint, including leaders. The cresting and finials to be painted two coats of such colors as may be selected, with gilded tips and points.

The store part to be finished in two coats of white shellac. The closet under stairs to have one coat of raw linseed oil. All door saddles oiled. The bottoms and tops of outside doors and all sash to be painted. The second story, including stairs, hallways, stair rails, first story halls, and closets, to have Wheeler's wood filler, and well picked out. Then finish with two coats of hard oil finish. The stair rails will be rubbed down, including balusters and newels. All cracks and nail holes to be well puttied up. Putty to match color of wood. Also paint privy and shutters on first story same as other wood work.

The costs are—

Mason work, complete	$1,900
Carpenter work, painting, tinning, etc..	1,900
	$3,800

FULL plans, specifications, and details, ready for the builder, of any of the houses illustrated in this publication, may be had on moderate terms at this office. Special plans and specifications for the erection of buildings of all grades are also supplied by us. Munn & Co., architects, 361 Broadway, New York.

Plans for the alteration and enlargement or improvement of buildings are also supplied.

A ONE STORY SOUTHERN RESIDENCE.

We illustrate her with a design for a comfortable one story Southern residence. The building has a front of 42 feet, side 84 feet, not including the front veranda. The dimensions of the rooms are ample, as will be seen from the plans. Their height is 13 feet in the clear.

Materials.—Foundation, brick. First story, to the top of the windows, clapboards, the balance shingles. Roof, shingles. Cost, $5,000. No cellar. The airiness and convenience of this dwelling will be readily understood by an examination of the floor plan.

Cost of Brick and Brickwork.

The cost of brickwork depends on the cost of he bricks and delivering same at the building, the wages of brick masons and helpers, the cost of mortar, and the use of tools, machinery, and scaffolding.

CONSTANTS FOR MORTAR PER M. BRICK.

M = 0·50 cubic feet (20 bricks per foot).
Sand = 0·35 cube yard.
Cement = 1·46 barrels of 300 pounds.
Or lime = 1·75 barrels.

Labor per M., including tools, etc., is about seven-eighths of masons' and helpers' wages per day for ordinary city buildings, but for government buildings it is about one and one-fourth times the same wages. This difference is principally because city houses generally have long party walls, with very few openings, and the frames for doors and windows are set in place while the brickwork is being built, whereas, in government work, all four sides of the building are fronts, and there are a great many windows and openings in the walls, which, of course, take more time to measure and build to than if the walls were plain, and the frames of doors and windows are not put in the building until the masonry is completed and the roof is on; besides, as a general rule, the work is better and stronger. Some of the brick walls for the building now being erected at Rochester, N. Y., had to be taken down on account of an extension having to be made, when it was found necessary to drill and split the brickwork with wedges in order to get the walls down, the cement mortar very often being stronger than the brick.

A brick mason with helper should lay in common house walls 1,200 to 1,500 bricks per day of ten hours. In government work, the average is from 800 to 1,000 for common brick, and in pressed and moulded brick from 150 to 300 per day.

COST OF COMMON BRICK PER M. DELIVERED.

1884. Columbus, O.	$6 00	1886. Pittsburg, Pa.	$8 00
1884. Baltimore, Md.	8 00	1886. Des Moines, Ia.	10 00
1885. Jackson, Miss	4 00	1886. Dallas, Tex.	8 50
1882. Toledo, O.	8 00	1886. Jefferson City, Mo.	8 00
1883. Denver, Col.	7 50	1886. Rochester, N. Y.	8 00
1886. San Francisco, Cal.	8 50	1884. Rochester, N. Y.	7 00

COST OF BRICKWORK PER M. LAID COMPLETE.

1884. Poughkeepsie, N. Y.	$21 50	1885. Fort Wayne, Ind.	$16 00
1885. Dallas, Tex.	16 00	1884. Rochester, N. Y.	14 00
1885. Brooklyn, N. Y.	15 35	1886. Rochester, N. Y.	15 50
1885. Pittsburg, Pa.	14 00	1886. Des Moines, Ia.	17 00

PRESSED BRICK.

Bricks alone, delivered, cost from $20 to $30 per M. Selected red, about $15 to $18 per M.

COST PER M., PRESSED BRICK, LAID COMPLETE.

1884. Poughkeepsie, N. Y.	$60 00	1885. Brooklyn, N. Y	$40 00
1885. Jackson, Tenn	65 00	1886. San Francisco, Cal.	45 00

Moulded bricks cost from $40 per M. up to $120, depending upon the profiles. The average for the profiles ordinarily used is about $70, and the cost of laying averages about $30 per M.

Enameled bricks, on edge, cost about $68 per M. Enameled bricks, on edge and end, cost about $75 per M. Enameled bricks, on edge and flat, cost about $100 per M., and the cost of laying them is from $30 to $35 per M.

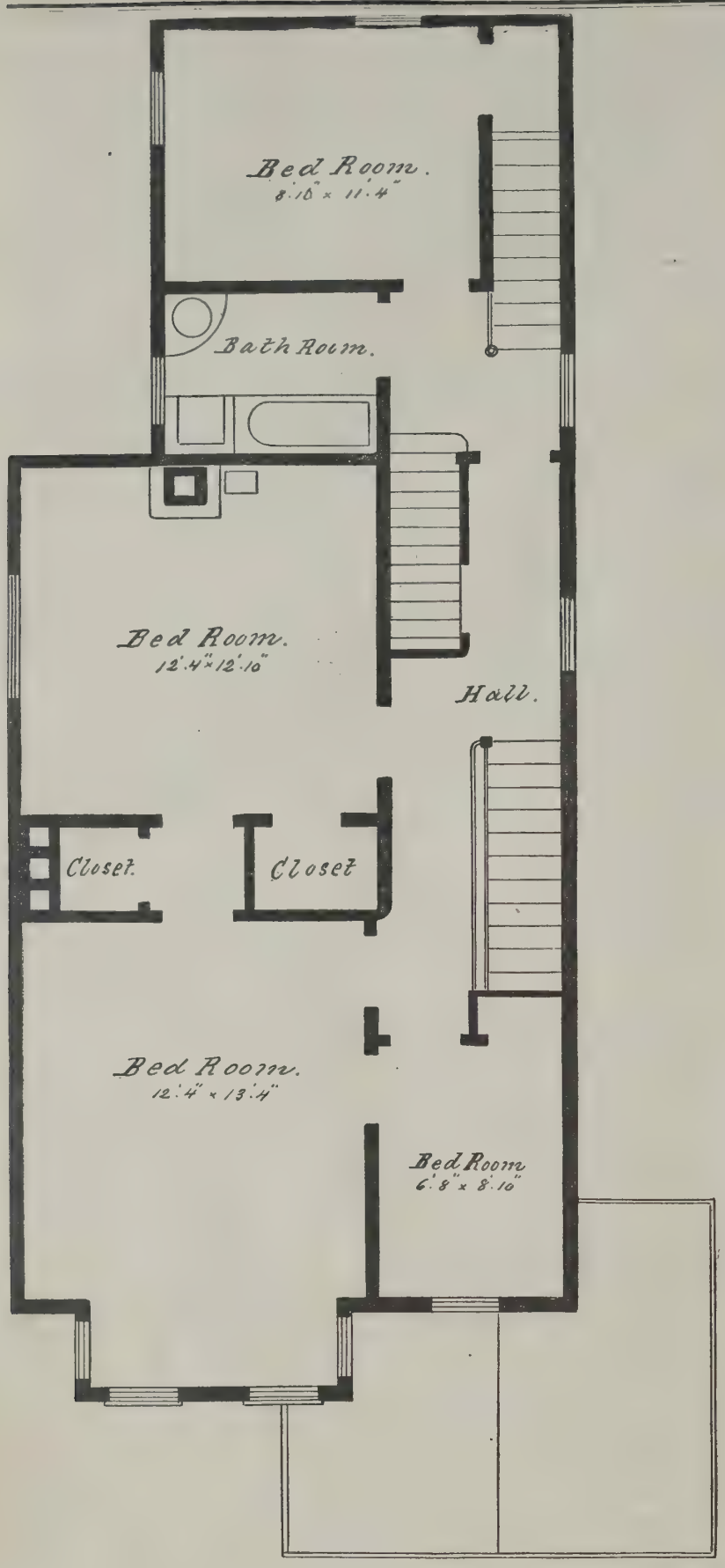
The price of terra-cotta depends upon the pattern or design, the average cost per square foot of exposed surface laid in wall complete being, for stock patterns, about $1.50, and for special designs from $2 to $2.50.—*Jas. E. Blackwell, in Amer. Architect.*

DWELLING FOR A NARROW LOT.

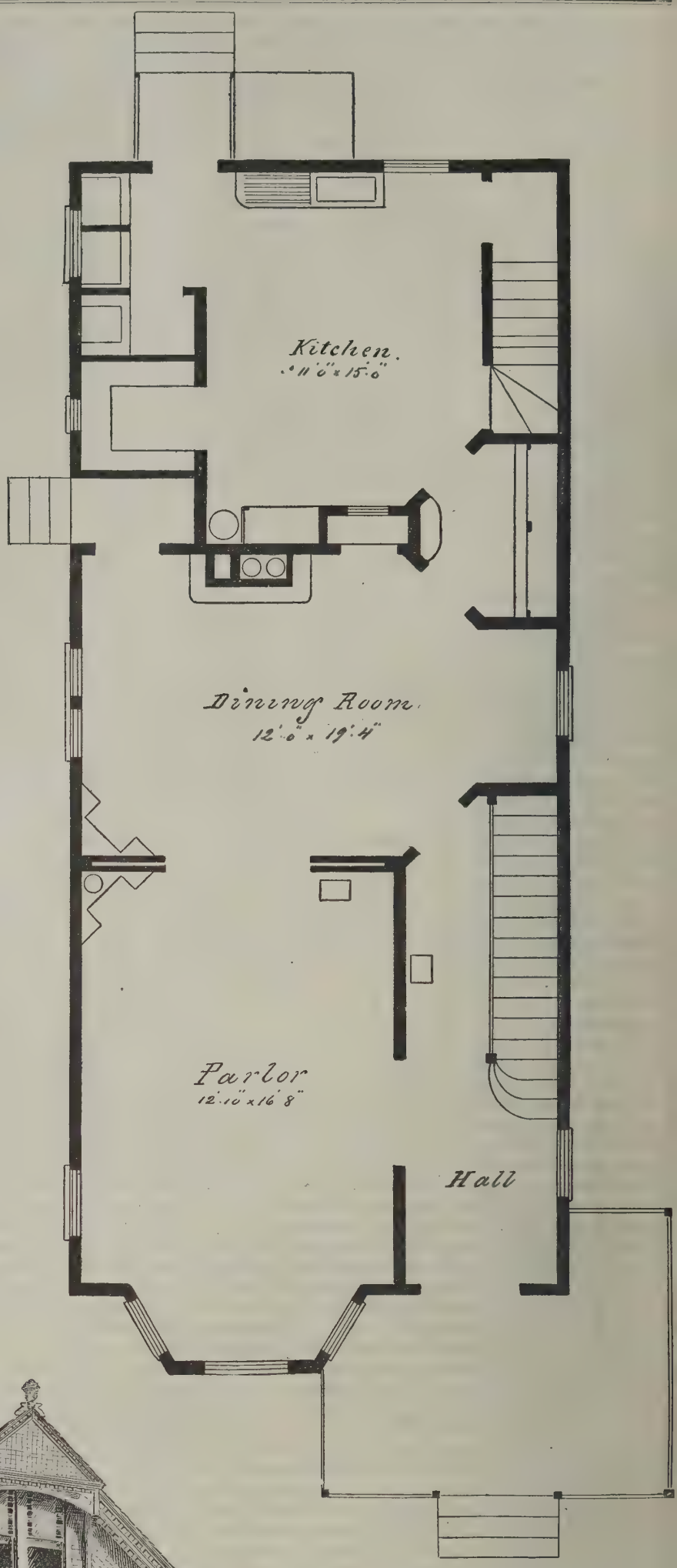
The two story attic house shown in our engraving has been erected in the vicinity of New York, at a cost of thirty-five hundred dollars. It has a good cellar, is provided with furnace and all the modern conveniences. Presents a handsome appearance and gives much satisfaction. In some localities where materials are cheaper the house could be built for less than the sum above mentioned.

A HOUSE FOR $2,800.

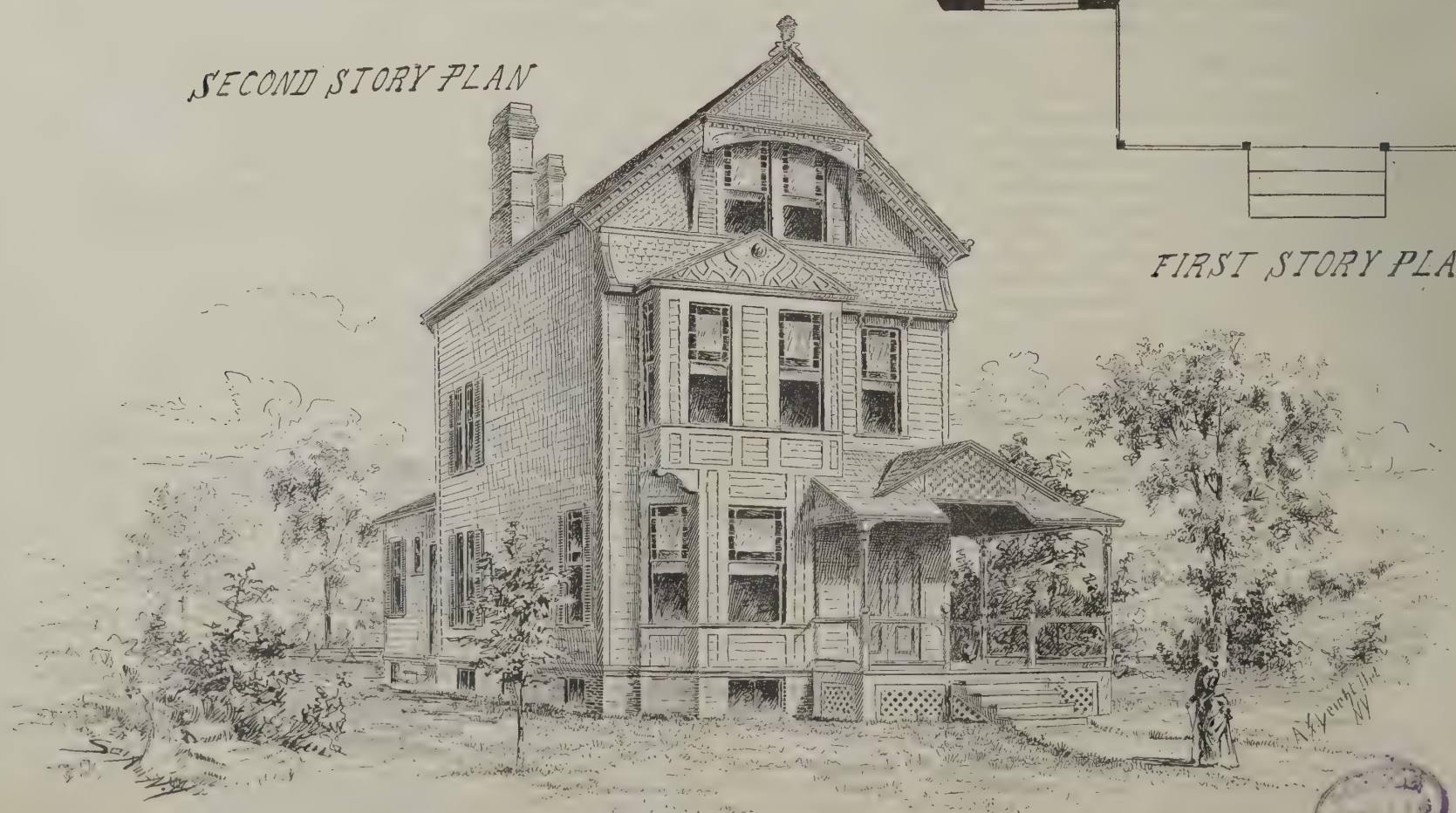
Our illustration shows a compact two story and attic dwelling erected at Arlington, N. J., at a cost, without plumbing of $2,800. It is 33 ft. in length by 28 ft. in width. Has a good cellar and attic. The exterior presents an agreeable variety in its details and shows to good advantage.



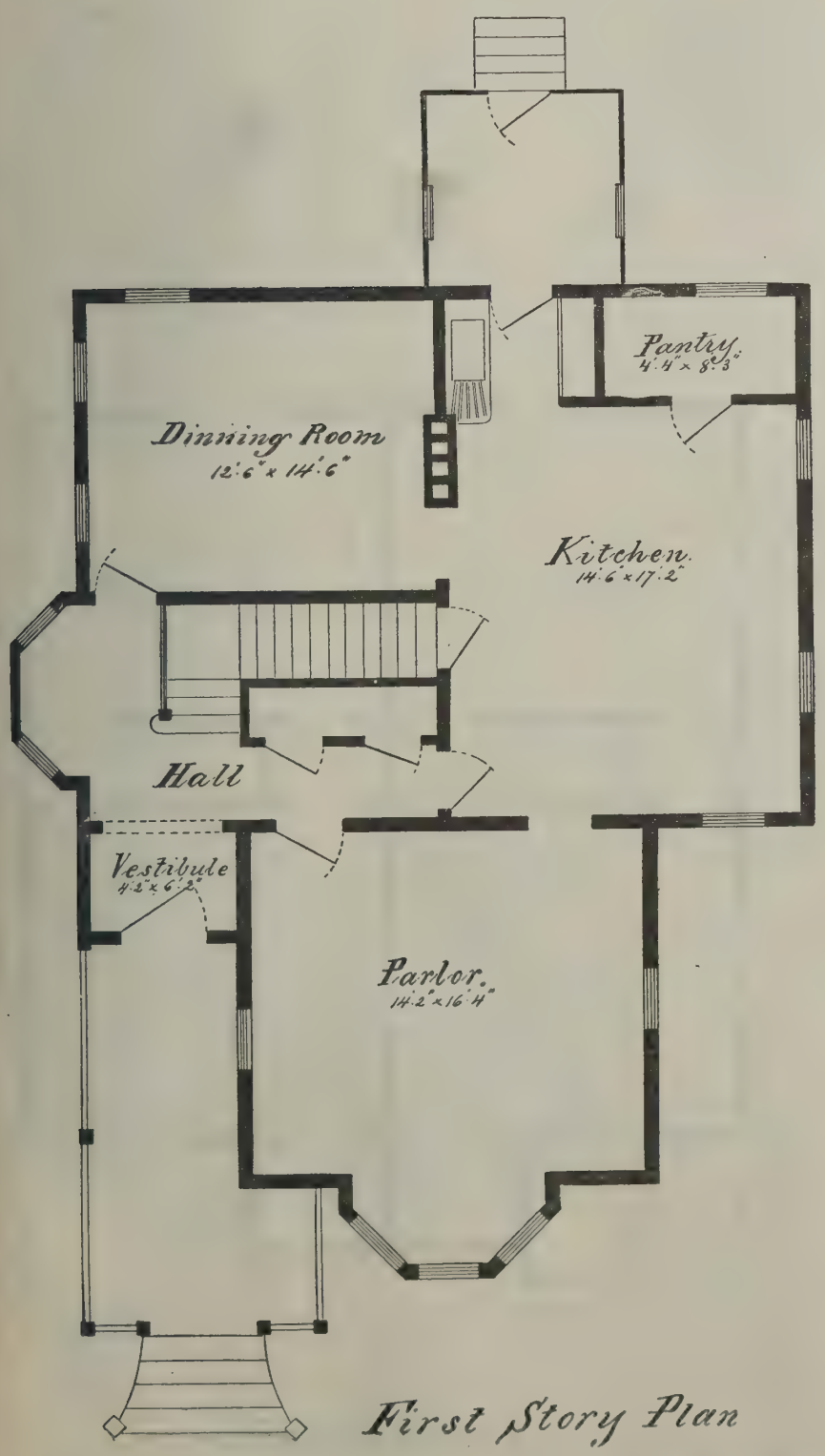
SECOND STORY PLAN



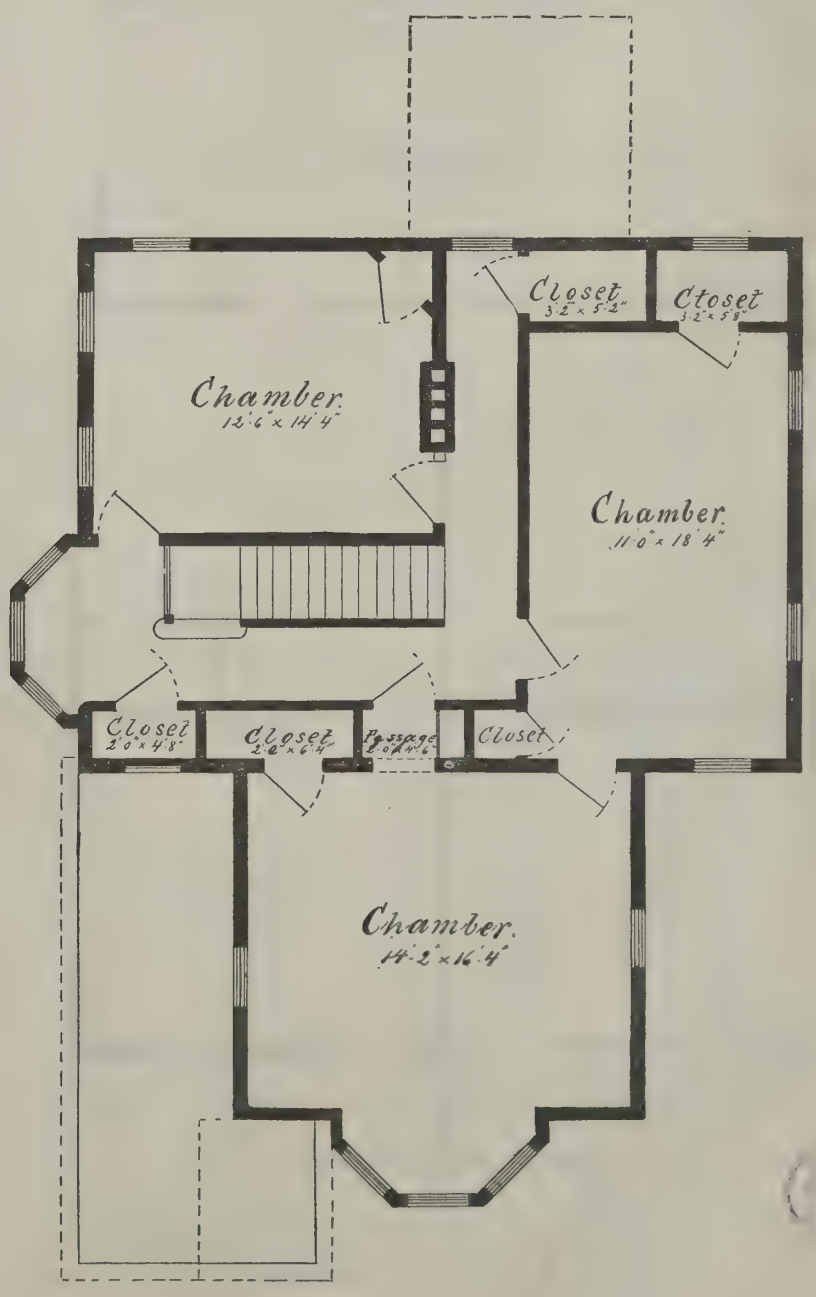
FIRST STORY PLAN.



DWELLING FOR A NARROW LOT.—[For description see page 83.]



First Story Plan

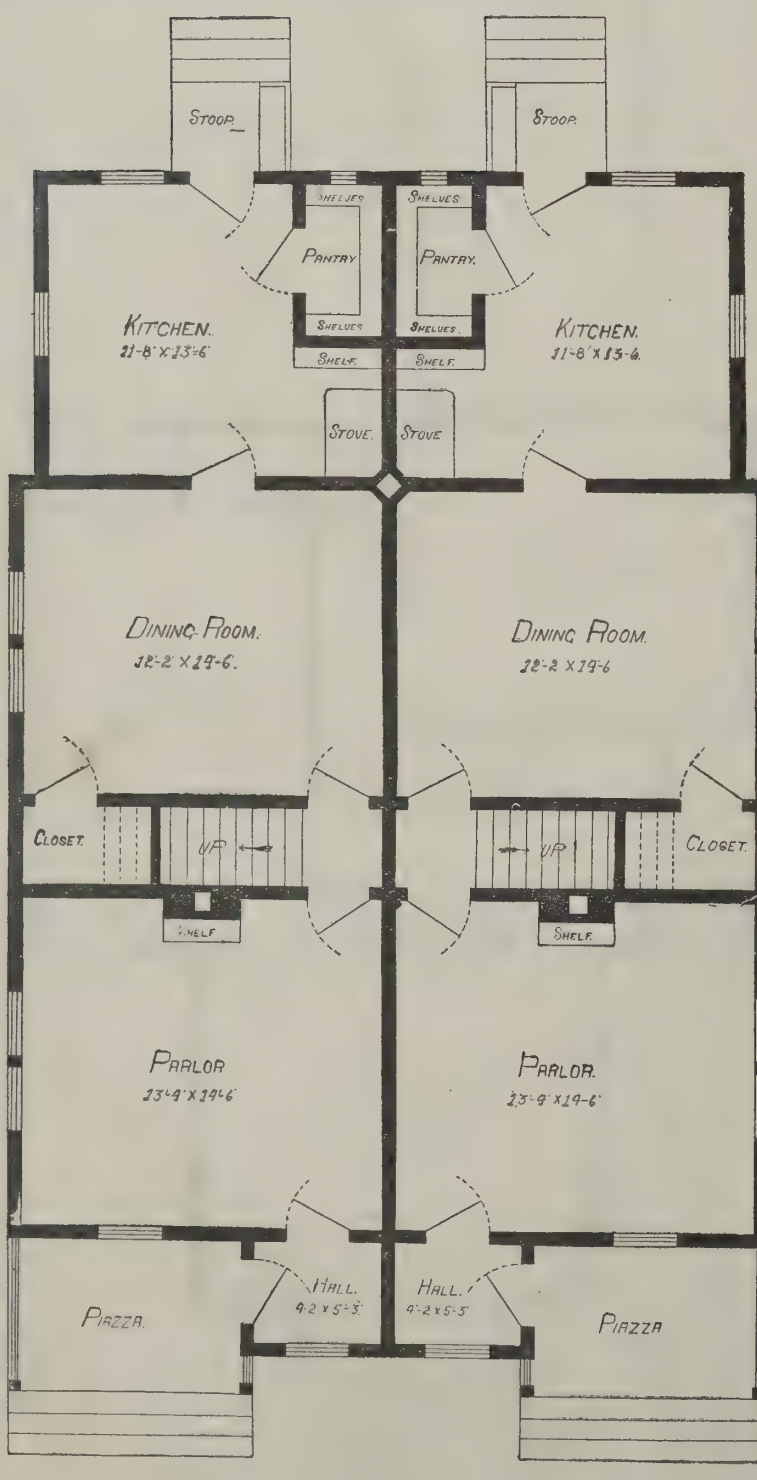


Second Story Plan

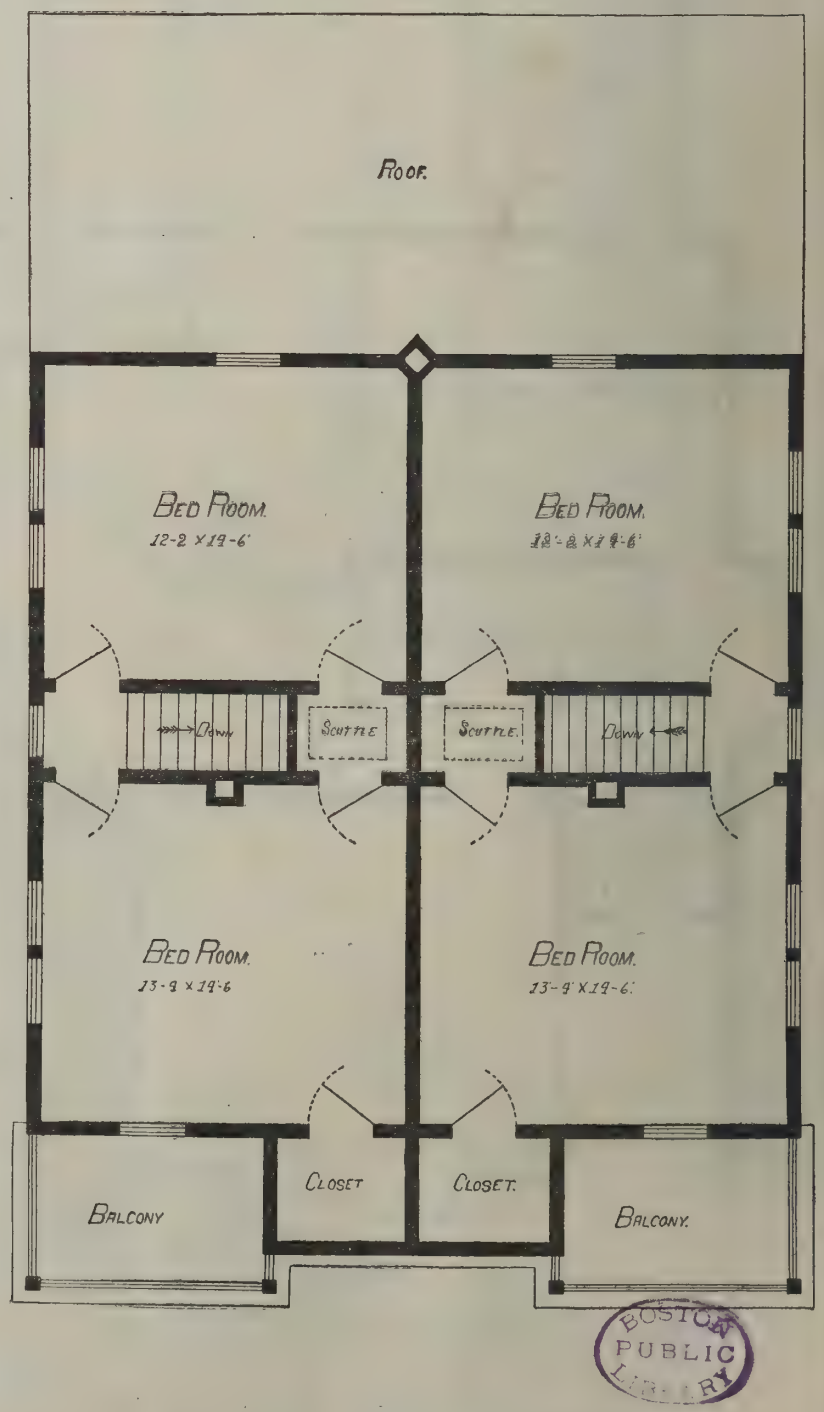
A HOUSE FOR $2,800.—[For description see page 83.]

A DOUBLE HOUSE OF MODERATE COST.

This double dwelling was designed for erection in Iowa, and the builder's estimate for that locality was $1,800. It is 28 ft. wide over all and 45 ft long, contains ten rooms, five for each tenant, all conveniently arranged. The piazza entrances are entirely separated, provided with vestibule doors. There is ample closet room. Altogether the plan gives much satisfaction, while the exterior is pleasing.



First Floor Plan.



Second Floor Plan.

A DOUBLE HOUSE OF MODERATE COST

UNITED STATES MAIL CHUTES FOR INTERIORS OF BUILDINGS.

The government provides, in all large cities, most excellent facilities for collecting letters for the mails, the collectors making tours of the streets for this purpose from two or three to a dozen times a day, and taking up the letters deposited in the lamp post boxes, or receptacles placed in the most convenient public places, often as frequently as every hour. Business men are thus enabled to dispatch their correspondence with a promptness almost as marked as if they had special messengers and chartered express trains constantly ready for service.

Everything which in any way contributes to quick service needs only to be known to be duly appreciated and adopted, a fact which is now becoming apparent in regard to the Cutler mailing system, or patented mail chute, at present acknowledged to be the proper supplement and accompaniment of the passenger elevator in all high commercial or office buildings. The illustration herewith shows the working and explains the utility of the mail chute. After obtaining the consent of the postmaster, a United States mail box is located in the lower corridor of a building, and to it is joined a conductor made of metal and plate glass, handsomely finished, which runs up through the building, and is provided with openings in each story. Here the occupants deposit their mail, instead of having to descend to the street for the purpose, and so deliver it directly into the United States mail box.

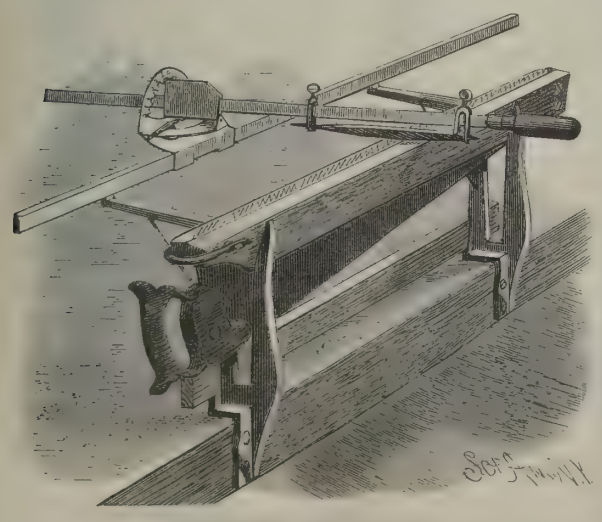
The chute in its present improved form is made in ingeniously constructed sections about four feet long, so arranged as to be readily taken out in case of accident. A simple but efficient means of rendering the point of passing through each floor waterproof is employed, and in buildings whose height makes it necessary an elastic bottom is placed in the mail box to break the fall of heavy matter. Adjustment is made in each story to permit expansion and contraction to take place without affecting the joints between the plates of glass and metal, and the mail openings are protected from improper use or crowding large packages into the tube by a balanced guard of brass with the front edge milled, any effort to force this resulting in closing the opening.

This improvement is now in use in nineteen of the largest cities of the country, and in most of the finest office buildings which have been constructed, so that a structure intended to be occupied for office purposes cannot be said to be completely equipped with all the modern improvements without it. Further information relative to this system, which is fully covered by United States patents, will be cheerfully furnished by the sole makers, The Cutler Manufacturing Co., Rochester, N. Y.

THE CUTLER MAILING CHUTE FOR POSTING LETTERS.

AN IMPROVED SAW FILING MACHINE.

An efficient and easily worked device by which saw teeth may be filed to an accurate and uniform bevel and pitch is shown in the accompanying illustration, and has been patented by Mr. Hamilton Sherman, of Waverly, Pa. It consists of a file frame guide with a base plate sliding on a guide bar. A head piece is pivoted to the base plate, so as to be movable in horizontal plane, and has a guide frame for the file-holding



SHERMAN'S SAW FILER.

frame bar to slide through, pivoted to the head piece, to swing to either side of a vertical line, there being catches for holding the file to the required sidewise, slanting, and axial positions. The saw is firmly held in the clamp of the machine frame, which is so made as to be easily taken apart and put together, and the file frame, in which the file has been set, is adjusted at the required angle to give the proper bevel to the saw teeth, and also to set the file axially, and the file is then held relatively in these same positions to the saw throughout the work of filing. Accuracy and uniformity are thus secured, and the operation can be most expeditiously performed.

Drawing and Engineering Instruments.

With the rapidly growing engineering and manufacturing interests of this country, there naturally comes an increasing demand for fine engineering instruments and supplies. In years past, the bulk of fine drawing and engineering instruments came from Europe, but now such instruments are made in this country in large quantities, and of a quality equaling, if not surpassing, anything produced in other countries.

We have before us a very complete and finely illustrated catalogue of instruments manufactured and sold by Messrs. Keuffel & Esser, of this city. In this catalogue is described every imaginable article for the use of the draughtsman, architect, or civil engineer. All of the recent appliances are illustrated, many of them for the first time.

This firm have an extensive factory in Hoboken, N. J., a store and wareroom at 127 Fulton Street and 42 Ann Street, New York City, and they have recently established a house in Berlin.

We are pleased to note the rapid growth of this industry, not only on account of its importance to this city, but also on account of being a sort of index to the prosperity of manufacturing and engineering interests generaliy.

Tests of Portland Cement.

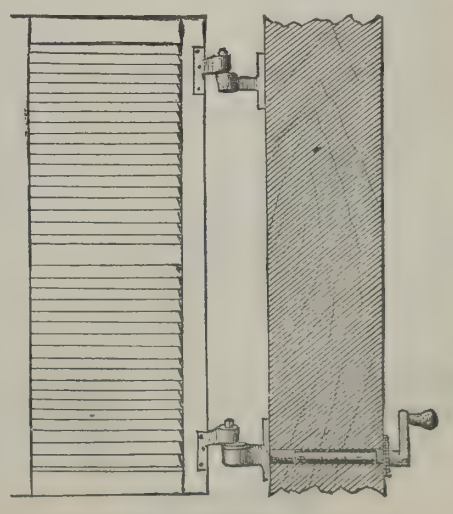
In obtaining reliable results, certain tests are necessary in the use of Portland cement. Weight per bushel is not always to be relied on, unless the cement is fed through a standard hopper into a measure of standard size. One authority, Mr. D. L. Collins, gives rules for this weighing, and a drawing of a hopper. Fine grinding is of more importance, and it makes great difference to the weight, as may be observed by passing the best cement freshly ground through an eighty mesh sieve, and leaving certain percentages of residue. All cement increases in bulk and weighs less with age. Fineness of grinding is one of the safest tests. For engineering works the per cent. residue left should be under ten through a sieve with 2,500 meshes, and for special work the same residue through a sieve of 6,400 meshes. Speaking of the water test, Mr. Collins says it is one of the safest guards as to the soundness of cement; and recommends that thin cakes should be made up and placed upon pieces of glass or other non-absorbent material, and then, when thoroughly set, one cake should be immersed in water, the other being kept in the air. Before immersion, the cakes may sometimes require twenty-four hours to become set. If after this the cakes show cracks in the outer edge, the cement should not be passed unless it can be proved that the defect is due only to freshness of grinding, and can, therefore, be thoroughly remedied by air slaking. A glass test tube filled with gauged cement is a good test. If the tube cracks in two or three days, the cement is good. If the expansion bursts the glass to pieces, it is inferior. Many clerks of works use the test tube, and on all works where good cement is required it ought to be tested in this manner.—*Building News.*

Whooping Cough a Dangerous Disease.

The attorney-general of the State of Michigan has recently handed the secretary of the State Board of Health a decision in which whooping cough is classed among those diseases which are "dangerous to the public health," and which are required by the statutes of Michigan to be reported by the attending physicians to the health officer or clerk of the local board of health. The evidence which was placed before the attorney general, and on which he based his decision, was that while small-pox was the cause assigned to the average number of 53 deaths reported each year to the secretary of state for ten years, ending with 1882, whooping cough was reported to have averaged 156 deaths per year during the same decade. In England whooping cough comes next to scarlet fever in causing deaths, and it is a notorious enemy of infant life. The inclusion of this disease among those which must be recognized by boards of health as dangerous to the public health is a step in advance. We see so many nowadays that the steps sound like the passing of a platoon of infantry, and the progress is very gratifying. Now, when boards of health and health commissioners make recognition of measles as a contagious cause of needless deaths, the pegs can be set up a notch higher to denote sanitary advancement.—*Sanitary News.*

AN IMPROVED DEVICE FOR WORKING WINDOW SHUTTERS.

A simple mechanical device by which a window shutter can be opened or closed, or fixed in any desired position, from the inside of a room, without opening the window, is represented in the accompanying illustration. The fixture takes the place of the lower hinge of the shutter, and has a rod which passes through the side of the window frame into the room, to which is attached a small handle. On the outer end of the rod is a worm or screw, which meshes into a worm wheel working horizontally on a small bracket, no larger than an ordinary hinge, this worm wheel carrying a shutter supporting arm, the working parts being incased so as not to be affected by rust, snow, ice, or dust. The handles and escutcheons are made of imitation bronze, brass, bronze, or nickel plate, and the knobs of rosewood, the handle being all that shows on the inside of the house. When it is desired to open or close the blinds, it is only necessary to turn the handle, thereby opening, closing, bowing, or fixing the shutters in any desired position, without raising the windows, screens, or curtains, and in a way so simple that any child can operate it. The pantentee and



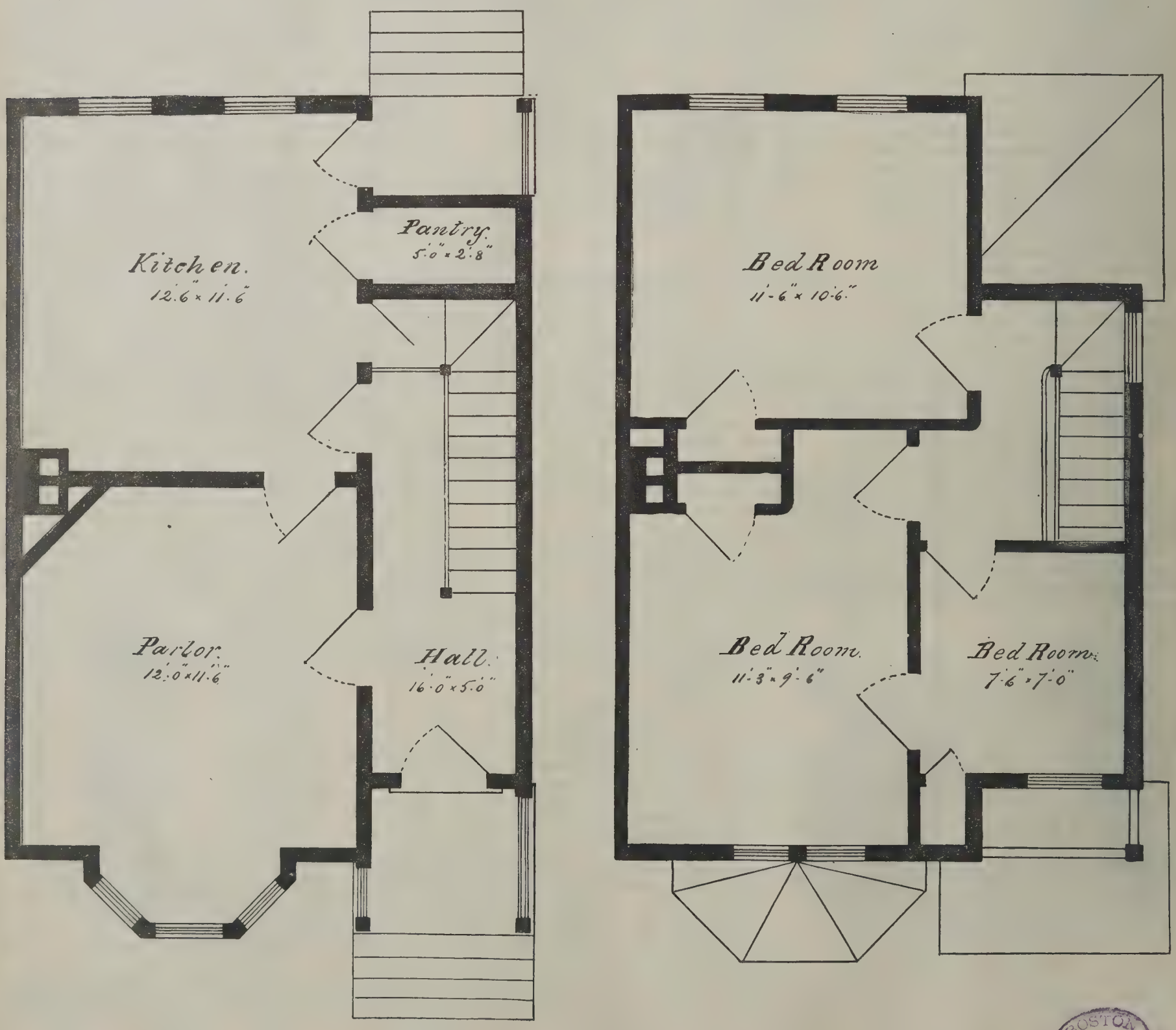
MALLORY'S SHUTTER WORKER.

manufacturer of this improved device is Mr. Frank B. Mallory of Flemington, N. J., and No. 60 Liberty Street, New York.

It is now an imperial regulation in Brazil that persons who die from yellow fever shall be cremated, the state bearing the whole expense. This decree might be extended judiciously to all contagious diseases.

A $1,250 HOME.

Our engraving shows a perspective of a neat little two-story attic house, designed by E. M. Van Duzer, architect, Newark, N. J., which can be erected hereabout for $1,250, and for less money where lumber is cheaper. The arrangement of rooms is convenient.



FIRST FLOOR SECOND FLOOR.

A TWELVE HUNDRED AND FIFTY DOLLAR HOME.

A HOUSE AT FLUSHING, N. Y.

We give a drawing of a comfortable and substantial dwelling at Flushing, N. Y., for which we are indebted to *Building*. William A. Bates, architect, New York. We give a floor plan, from which the general arrangement will be understood. Constructed and finished in satisfactory manner, we estimate the cost at about eight thousand dollars.

Painting Brick and Stone Buildings.

To prevent the disintegration of exterior brick or stone surfaces, caused by moisture of the atmosphere and change of temperature, paint should be used to cover the surface. Particularly in our Western cities do we find the stone gradually crumbling away, the same action taking place with the brick. The process of decay is certainly slow, but it is sure. How often do we see magnificent stone or brick edifices gradually scaling and crumbling down, when by the application of a coat of paint the action could be prevented for years.

The great object is how and what to paint these surfaces with. In the first place, it is useless to ruin the outside appearance by an application of cheap trash which can be of no material benefit so far as preservation is concerned. It must be borne in mind that paints are mainly durable, and make the surfaces that they cover durable, because of the water proof quality of the oil out of which they are mixed.

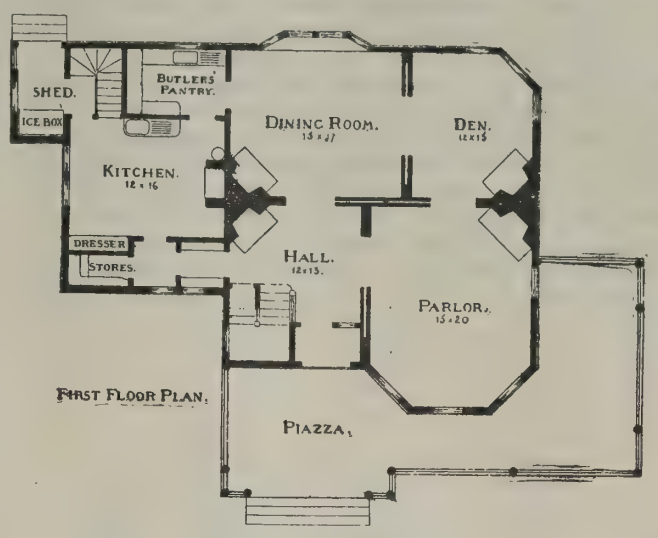
The natural pigments—called ochers or earth paints—do not in any degree act upon the oil; while others, such as white lead and the chromates of lead, do affect the oil chemically, and impair in a measure its tenacity and water proof quality. For these reasons it follows that the natural pigments are not only the most economical, but also the most durable for painting brick or stone houses.

It has been demonstrated that the most durable paint for brick or stone houses is finely ground French ocher, mixed in proportionate quantities with white zinc. The color produced is a soft shade of buff, most pleasant to the eye and permanent to the last degree, both in color and material.

Venetian red, an artificial ocher or red oxide of iron, is in common use, but it does not hold oil like ocher, and makes a coating far less water proof. It is a seemingly durable paint, because the stain which it imparts to a porous surface remains long after the oil has washed away. It cannot be used with zinc, because of the unsuitable color which it produces, and because this pigment (Venetian red) when tinted with white becomes highly fugitive in color.

The condition of the wall is also very important in painting brick or stone surfaces. The work should be done in warm, dry weather, when the moisture which the bricks or stone absorb during the winter and spring seasons has dried out, otherwise the paint will not be apt to adhere tenaciously, but will scale or peel off. The joints require constant looking after in the coping. These should be made absolutely impervious to water by the application of soft putty in a mass both on the top and the edges, and when this hardens to the point of cracking, it should be renewed. Mortar and cement for such purposes are useless, for no matter how water proof the surface may be, if the water be allowed to percolate through the joints, the integrity of the wall will be destroyed.

The first coating of paint for brick or stone should be mixed very thin, more as an oil stain than as a paint, to allow the brick to absorb all that is possible. By being thin, moreover, the paint readily runs into cavities that thicker material would not penetrate. The second coat can be used heavier in body. Then by the application of one coat every few years a building would last indefinitely, and the owner would feel that his building was proof against the atmospheric changes. —*T., in Master Mechanic.*



A HOUSE AT FLUSHING, N. Y.

Frosted Glass.

In building, an artistic use is made of a new glass invented by Mr. Bay, of Paris, and called frosted glass (*verre givree*). It reproduces the pretty patterns that frost produces upon window panes, and that have been called ice flowers. Mr. E. Boulanger, the architect, has brought this product to the attention of the Central Society of Architects. The process of making this glass is very simple. It consists in coating the surface of the glass, which has previously been ground with sand, with a sort of varnish that enters the cavities produced by the sand. The panes of glass thus coated are then put into a stove, or, in summer, are simply exposed to the sun. Under the influence of the heat, the coating dries and contracts, and breaks up into little scales that remove small particles from the surface of the glass.

The roughness is removed at the spot where each scale cracked off, and the effect produced is that of crystallization. As these different crystallizations or fractures take place in every direction, they produce, as a whole, an effect exactly resembling that produced by frost upon a window pane.

The pattern thus formed may be very small if the layer of varnish is thin, and the crystallizations are so much the larger, within certain limits, in proportion as the coatings are more numerous.

As many as six coats may be applied, and at this point the glass is reduced a half in thickness if the operation has been performed upon simple glass.

This same process can likewise be applied to colored glass. The coating, on drying, removes the colored enamel, which is of uniform thickness, and the frosted glass produced exhibits half tint colorations of a very pretty effect. The glass thus frosted, while it allows the light to enter, does not permit of anything being seen through it.

Upon gilding or silvering the frosted glass on the opposite side, we obtain the appearance of enamels of all colors, according to the colored glass employed. Under such circumstances, this glass can be used in the decoration of ceilings, cornices, friezes, window frames, mirror frames, etc. By the same process, the effect of crystallization can be obtained upon lamp globes.—*Le Genie Civil.*

Action of Frost on Cements.

Some experiments have lately been made at Schandau on the action of frost on hydraulic mortars and cements when these materials are mixed with water containing different percentages of salt. In making the experiments a series of stone cubes of about 2·4 in. edge were united with cement, which in one case was mixed with pure water and in other cases with water containing from 2 to 8 per cent. of salt. While the cement was still fresh, these blocks were placed in the open air, and exposed for a period of twenty-one days to a temperature varying from 20 deg. to 32 deg. Fahr., after which they were kept for a further period of seven days in a warm room. At the end of this time the joints were tested, with the result that the cement mixed with pure water was completely disintegrated, having no holding power. The cement mixed with water containing two per cent. of salt was somewhat better, though the results obtained with it could hardly be considered satisfactory, while that mixed with the eight per cent. solution was uninjured by the exposure.

Oil of Bay for Flies.

The bay tree, which the French term *le laurier des poetes*, and its product, the oil of bay, or *huile de laurier*, have been recently mentioned in some of our foreign exchanges as proving an excellent remedy for the nuisance caused by flies during the hot months of the year. We are informed, says the *Monthly Magazine*, that this oil is already extensively used in Switzerland by butchers, to keep their shops free from flies, and that after a coat of bay oil has been applied to the walls, none of these troublesome pests will come near the place. For many years past this same *huile de laurier* has been used in the south of France for preserving gilt frames, chandeliers, etc., from becoming spotted and soiled by insects. No fly will alight, it is said, on a gilt surface thus treated, and rooms in which such an application has been made to the frames of pictures are soon found to be quite devoid of flies.

A HOUSE AT FLUSHING, N. Y.

THE COURT HOUSE AND POST OFFICE AT SAN ANTONIO, TEXAS.

We are indebted to the *American Architect* for our view of the edifice. It is an imposing and substantial structure.

Decorative Novelties.

Among new fireplace facings may be mentioned an artificial lapis-lazuli of great beauty in its depth and variety of shades of blue; this material is set either in small oblongs in brick fashion or broken in pieces and set like mosaic; in either way the effect is rich and pleasing. Another new facing set in mosaic is mother-of-pearl, giving out a hundred lusters of varying radiance and color. Another facing in the richest shades of brown and yellow is shown in tortoise-shell effect tiles set brick fashion. Among the richest colorings in uhese same small tiles is what is called bronze olive, which harmonizes delightfully with birch wood of nattral finish, mahogany, sycamore, and antique oak. A lovely dining room mantel of this latter wood shows the new fireplace, called the hob fireplace, set with shaded creamy yellow tiles of a square shape. On either side of the facing, rising from the hearth, is a square faced with tiles and topped by polished brass about twelve inches high and square, on which the teapot may be set to keep the tea warm. Above the fireplace opening is a fireplace or mantel closet set midway between the shelf and the top of the openiug. This closet is lined with polished brass, and shows locked receptacles, one at each end, having doors set with opalescent jewels, the central portion being open. In these closets some of the dishes of a five o'clock tea may be placed to keep warm. Hob fireplaces are not confined to the dining room, but are often attached to a boudoir or drawing-room mantel. A charming example of the latter is of wood finished to an antique ivory effect, the design in old colonial style. In this case the facing is composed of square creamy yellow shaded tiles and the under shelf closet lined with polished wood finished in dead dull gold; the locked receptacles at either end show doors set with heavy beveled plate glass. A pleasing feature of the first-mentioned antique oak mantel is the shelf arrangement, there being two somewhat short shelves, the space between being divided in panels, each panel set with a heavy beveled mirror. Above the top shelf the chimney breast is fronted by paneling in oak, surmounted by a handsomely carved frieze. Something new and effective is the hooded grate opening, the hood composed of ornate brass work set with opalescent or else ruby jewels, or with oblongs of beveled glass. Some of the new fire dogs show animal subjects in polished brass, as a pair of lions, winged griffins, a dog and a cat, a pair of dragons, etc.

Among some mantel ornaments and furnishings may be mentioned a pretty clock, vases and candlesticks in a soft ivory finished ware decorated by paintings of flowers and birds in soft pinks, gold greens, blues and yellows, the set being suited for a boudoir mantel. An attractive ornament for the antique oak mantel is a cast of a majestic lion in fine French bronze of a verd antique shade; a fanciful clock of the same metal and coloring represents a large globe rolled up an incline by the feet of an acrobat.

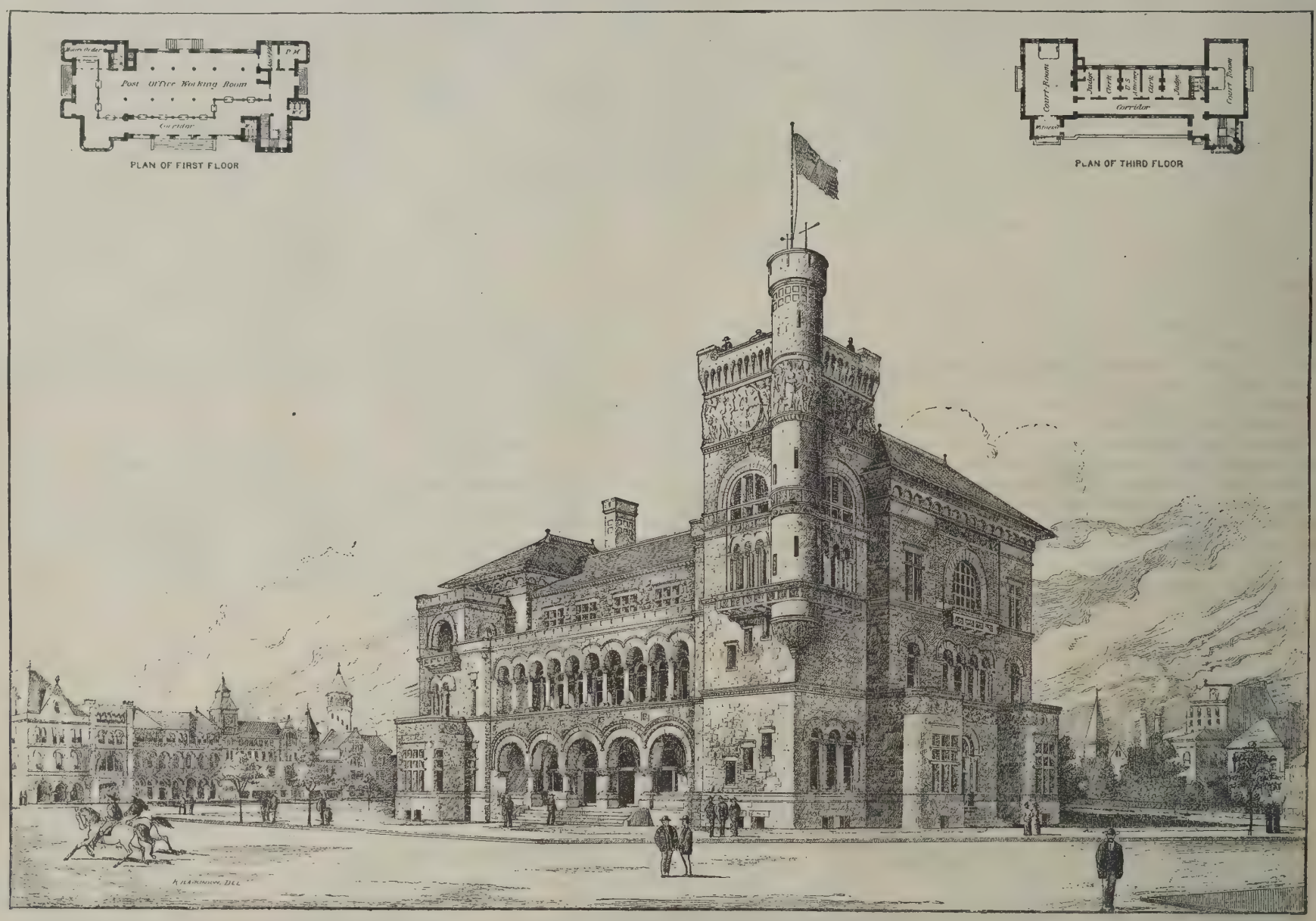
Among attractive and inexpensive upholsterings may be included satin Renaissance, rich in effect, and said to be durable, being composed of worsted and silk; satin de Leon at $1.50 per yard is also a handsome silk and worsted fabric; both are fifty inches wide. A very refined petit point tapestry suited for upholstering or for a portiere shows a gold colored silk ground, brocaded by groups of large flowers in low tones of red, blue, olive, and ecru of very refined effect. Silk brocatelle, now so fashionable, in some fine combinations of color may now be had at comparatively low prices. Moleskin is a fairly durable and rich-looking material printed in rich colors; a handsome example shows an all over poppy pattern in yellows, reds, blues, and olives on a black ground, producing the softest effects. Silk warp tapestry is seen in the new tobacco-colored ground, brocaded by low-toned flowers. Among new curtain materials suitable for hall windows are the East India prints of scarlet and cream, and orange and cream, thin, sheer, and very gay in effect.

Some new rugs ca'led Salonicas are attractive and inexpensive, and some combinations and designs are really superior. Among ground colors of some of these rugs the most pleasing are the peachblow, amber, and slate blue, the designs copies from old Eastern rugs. Salonica rugs are of American manufacture, and are reversible. Some are 30 by16 inches in size; a thick, rich, deep ecru fringe finishes these rugs at their ends.

Cushion decoration seems to be a favorite form of needlework for summer exhibition. A very attractive cushion now on exhibition shows an all-over conventional flower and leaf pattern worked solidly in dull purple filoselles and old golds on a deep old gold ground, the design outlined by a fine gold colored silk cord, the sides of the cushion finished with moss trimming. Another cushion covered with ivory white sateen is powdered with whorls of oak leaves surrounding a small disk filled in with honeycomb stitch, the whorls and disks worked in gold color and brown silks. the background of ivory white showing scroll outlines in gold silk. A cushion in electric blue plush and satin shows a central band worked with wild roses in shaded outline. A refined-looking cushion of bronze green plush has for its ornamentation groups of conventional palms worked solidly in low yellows outlined by gold thread; a diagonal band of satin between the palms, which were worked in the corners, was embroidered with figures in blue and gold. Among new yacht cushions is one covered with Bolton sheeting, the sides laced ornamentally with old red cords.

Thanks are due for the above information to the Decorative Art Society, Conkling & Chivvis, Edgar Allien & Co., J. B. Shepherd, Stern & Co., and Conover & Co.

Tiles.—No art tiles in Europe surpass those of American manufacture, in purity, richness, variety of glazes, and picturesqueness of composition. Some lately on exhibition are exquisitely clouded in colors ranging from pale yellows and delicate grays to lustrous browns and strong tones of green. Others, made by a new process of glazing, have the glitter of burnished gold, and the delicate colors and sheen of mother of pearl. Many of the sets which come as borders of fireplaces are of marvelous beauty. One effective set is of chocolate brown highly glazed, painted with a continuous design of deep yellow daisies with black centers. In another set on a white ground are shown great bunches of red and pink carnations. Hearths with borders are made to accompany these tiles. Some tiles of terra cotta show a continuous pattern of hawthorn blossoms and are very decorative. Some lovely eight inch square tiles were lately painted by a lady after designs of a fireplace in the tea house at Eden Hall, one of the Duke of Westminster's seats. These tiles, twelve in number, represent the signs of the zodiac, with quaint lettering describing each tile. They are outlined in blue, in a white glazed ground, the letters being also in blue.—*Art Interchange.*



THE NEW UNITED STATES COURT HOUSE AND POST OFFICE, SAN ANTONIO, TEXAS—M. E. BELL, SUPERVISING ARCHITECT.

Colored Mortar for Brickwork.

The common bricks of almost any district may be sorted so as to produce contrast in tint or "tone"—red, and yellow or "cream color." This tint of the bricks may be preserved and heightened by using mortar of the same tone or tint. Furnace ashes and lime will produce a dark mortar, pounded red brick or red tile mixed with lime will give a red tone to mortar, and cheap mineral colors may be added to mortar for pointing. The color of mortar is sadly neglected, as generally the same white lime and sand are used for all tones of color in bricks, and not unfrequently white putty mortar is used for pointing the reddest as well as the lightest colored bricks.

DRY GOODS STORE AT WINONA.

The wholesale and retail dry goods house of H. Choate, of Winona, Minn., shown in the illustration, is situated on the corner of Third and Center streets, and is 40 ft. by 140 ft. The most part of the first story is built of jasper, with red granite columns. The rest of the building is built of pressed brick, with terra cotta and brown sandstone trimmings. In the tower seen in the rear is the elevator, which is entered either by the street direct or inside. The basement under the entire building is finished throughout. The inside will all be finely finished. C. A. Dunham, architect.

NEW DRY GOODS STORE, WINONA, MINN.

Blinds.

The editor of the Minneapolis *Lumberman* says that a prominent manufacturer said to him only a few days ago that, in his opinion, blinds were a fraud, but so long as the trade continued to demand them he should furnish them, while not understanding how any sane and sensible man could think of putting them either on or in a house. The inside blinds are little better than dust catchers. They are dirty to begin with, always catching and tearing drapery if any is hung about the window, and are given to getting out of order. Outside blinds positively preclude the use of storm sash, and in this northern latitude the storm sash has proved to be an economy as well as a comfort. It is time the blind was banished, and it certainly is being from all houses of the better class. Only the builders of the hideous white houses cling to them affectionately, and this class is rapidly being narrowed down to country towns and the farms. The money which this class put into blinds, if invested in storm sash, would add immensely to their comfort and save the cost of the windows in reduced fuel bills in the first three years.—*Builder and Woodworker.*

How to Clean and Polish Top Leather.

New enamel leather tops that have become dingy and soiled by allowing dust to accumulate on them, and clammy hands to handle them, can usually be restored to their former bright and clean condition by the use of castile soap and soft water, as described below.

Before applying the soap and water, the top should be thoroughly dusted off; first with the painter's duster and then with a soft cloth. Then to a quart of warm water add half a teaspoon of common washing soda, dip a soft sponge into the water, squeeze it out, rub the sponge on the soap to form a thin lather, and apply the sponge in a gentle manner to the leather. There should be no dripping from the sponge, but coat the entire leather work, including the bows and dash, with a thin coating of the lather, rinsing the sponge before applying it to the soap.

After all the leather work of the job has been treated with the soap and water, then rinse the vessel and the sponge, and get clean water without the soda. Dip the sponge into this clean water and squeeze it out until none will drip from it (by this we mean just a damp sponge), and apply the sponge to a part of the top. Then, immediately, with a soft, clean cloth or soft chamois-skin, rub gently but swiftly until the gloss returns. Continue this process until all the leather work has been gone over. Sometimes it is necessary to apply the sponge twice to certain parts of the leather before the stain or gum can be removed.

The above is our method of cleaning soiled enamel leather tops, which has proved successful; but, before dropping the subject, we will offer a few further suggestions that have occurred to us while thinking over the matter.

After the bindings have been trimmed off from the back and front bows, use a stick specially made for the purpose of blacking the raw edges and designed to avoid getting the black smeared over the leather, for all the different blacks contain more or less copperas, which is poison to leather that contains no oil. After the edges have been blacked, apply tallow to them. This can be done with a tickler and a rag. Then take a stick similar to the one used for the black, and coat the edges with top dressing. This will prevent water from getting in under the binding to rot it away, and at the same time it will give a finished appearance to the raw edges, which, after the top has been dusted two or three times, without the tallow and dressing applied to the edges, will otherwise become conspicuous.

When the job leaves the trimmer's bench, it should be placed out of the way and the top covered over; and, when the job is needed, the top should be dusted off before it goes into the warm paint room; and each time the painter dusts the body off, he should also dust the top, but no water should be used on the leather if it can be avoided. If it is a close top, the painter should be careful not to get pumice on the leather, and when the job is rubbed for finishing, the prop blocks, joints, and nuts should be attended to and the leather cleaned up. When the job is varnished and hung off, it is then only necessary to dust off the top.—*U. No, The Hub.*

A NOVELTY in ladies' watch cases is one-half plain, while the other half is ornamented in pink and yellow gold. The central setting of this case is a clover leaf formed of a ruby, a diamond, and a sapphire.

Screens.

Screens are among the brightest bits of house furnishing, and they can be made of so many designs that one is tempted to indulge the fancy, which makes even the largest, dullest room cozy and bright. A rustic screen can be made at home. For the frame secure poles with the bark still on, have the panels filled with heavy hardware paper, and in putting the sections together use leather hinges fastened with leather-headed tacks. Over the panels put moss, the flat moss which one finds upon stones and trees; attach it with glue, putting here and there tufts of long green moss, while upon the center of each panel an artistic group can be made by mounting a bird's nest among some tiny twigs flatly arranged against the background of moss. Another model has a flat frame of plain whitewood, or any wood most convenient. Cover the frame with an outer row of acorns filled in with beans or tiny cones; give the whole affair a coating of varnish. Have the panels filled with handsome paper or a very thin board, which should be gray or light brown in tone. Upon this background, for the center panel use a group of cattails, spread from the lower right hand corner to the left upper, confined by a ribbon in the center, while upon the outer panels (allowing always three panels for a screen) a group of pussy-willow upon the left, and millet, wheat, or corn upon the right. For bedroom screens the light wooden or bamboo frames are used, the panel spaces being filled by silk, cretonne, or muslin over colored cambric. The material is shirred, leaving a tiny ruffle top and bottom. Small square screens are made of lace and ribbon, while the panels of matting in white or color are simply ornamented with acorns, cones, or bunches of grain. Panels of a material made from wood pulp are very artistic, as the surface is raised in tiny mounds, and finished with metallic luster in gold, silver, copper, or bronze. Lincrusta-walton is very serviceable and effective for screen panels to be used in any room, while embroidered panels or painted panels of wood are easily secured. For balcony use in the summer, broad screens filled with panels of common white matting are the most serviceable and appropriate, while the groups of wild flowers which adorn them can be drawn in with a brush, life size. Old-fashioned flowers look best, the hollyhocks, trailing vines of the morning-glory or China rose, while the brilliant glory of the trumpet vine is never more thoroughly artistic than when allowed to mount in bewildering tangles over a balcony screen. Small screens for the table are made in three panels, filled generally with bits of embroidery in floss, linen, or silk. A small square or oval table screen can be made from a fan supported by a tiny brass holder. This fan should be bordered with lace, and upon the center group a cluster of paper flowers or bird's wings; with a bow of ribbon upon the handle the effect is bright and pretty.—*Amer. Art.*

To Transfer Prints to Wood.

The whitewood used, being perfectly smooth, should receive a few coats of French polish. The print to be transferred, having been dampened with a sponge soaked in spirits of wine, is placed on the wood with a piece of thick cloth over it. A warm iron is then passed gently over the cloth, care being taken not to shift the picture. Keep the iron rubbing backward and forward for ten or fifteen minutes, then take off your cloth, and leave it for some hours. Now get some cold water, dampen your finger in it, and rub the paper. Great care must be taken not to disturb the impression. Keep dampening your finger as you go on. When you have got the paper all off, you can polish over. Any kind of print will do which is not glazed. Ink impressions are the most easily transferred.

FRENCH SEASIDE COTTAGES.

Our drawing, which is from *Architektonische Rundschau*, shows the style for small seaside cottages, as recently erected at Lion on the sea, Calvados, by M. Maget, architect.

These cottages are substantially built, are roomy, but not luxuriously finished. The walls are of stone and brick set in hydraulic cement. The house at the left has a parlor 14 × 20 ft., two bed rooms, and bath room on first floor; kitchen, etc, in basement. Estimated cost here about $2,500. The central house is larger, cost about $4,000. The house at the right should cost about $3,000. The scale shows the dimensions in meters.

Rules for Gas Fitting.

The superintendent in charge of affairs at the gas works now being constructed at Waukesha, Wis., and known under the corporate name of the Waukesha American Gas Company, has promulgated the following rules, to be adhered to by the plumbers of that city when piping houses for gas supply:

1. The following table shows the proportionate size and length of tubing allowed to be run:

Size of tubing.	Greatest length allowed.	Greatest number of openings.
⅜ inch.	20 feet.	2
½ "	30 "	3
¾ "	70 "	10
1 "	90 "	15
1¼ "	100 "	30
1½ "	150 "	60
2 "	200 "	100

No quarter-inch pipe must be concealed, and only six feet for one opening can be used as risers and drops for bracket lights of unconcealed work.

2. The riser in any building must not be less than eighteen inches from the floor for two, three, and ten openings; two feet six inches for fifteen and thirty openings; four feet for fifty and one hundred openings.

3. No riser in any building must be less than three quarters of an inch, except when there are but three openings, when one half inch will be allowed. In buildings with double parlors the drops must be one half inch, with a set from the main line of pipe of not less than four inches, dropped square, and well secured by gas hooks to the joists, the same to be observed on all cross lines of pipe. Drops and side openings, where nipples are used, must be made secure by lock nut, or solder, to prevent them turning inside the plaster, and must be well secured by gas hooks; and where a coupling or L is used on the drop, then a strap or lock nut must be soldered to the drop and fastened to the joists with screws.

4. The rise pipes in all buildings must be placed where the meter and stopcock can be readily got at for the convenience of the consumer to turn off the gas, and for the employes of the company to read the index and put the meter in order when required; and in no case will a meter be set where it will be exposed to damp or frost, or be liable to injury from any cause.

5. Service pipes, when extended from where the company has left them, must, in all cases, be continued the same size as said service pipe laid by the company up to the meter.

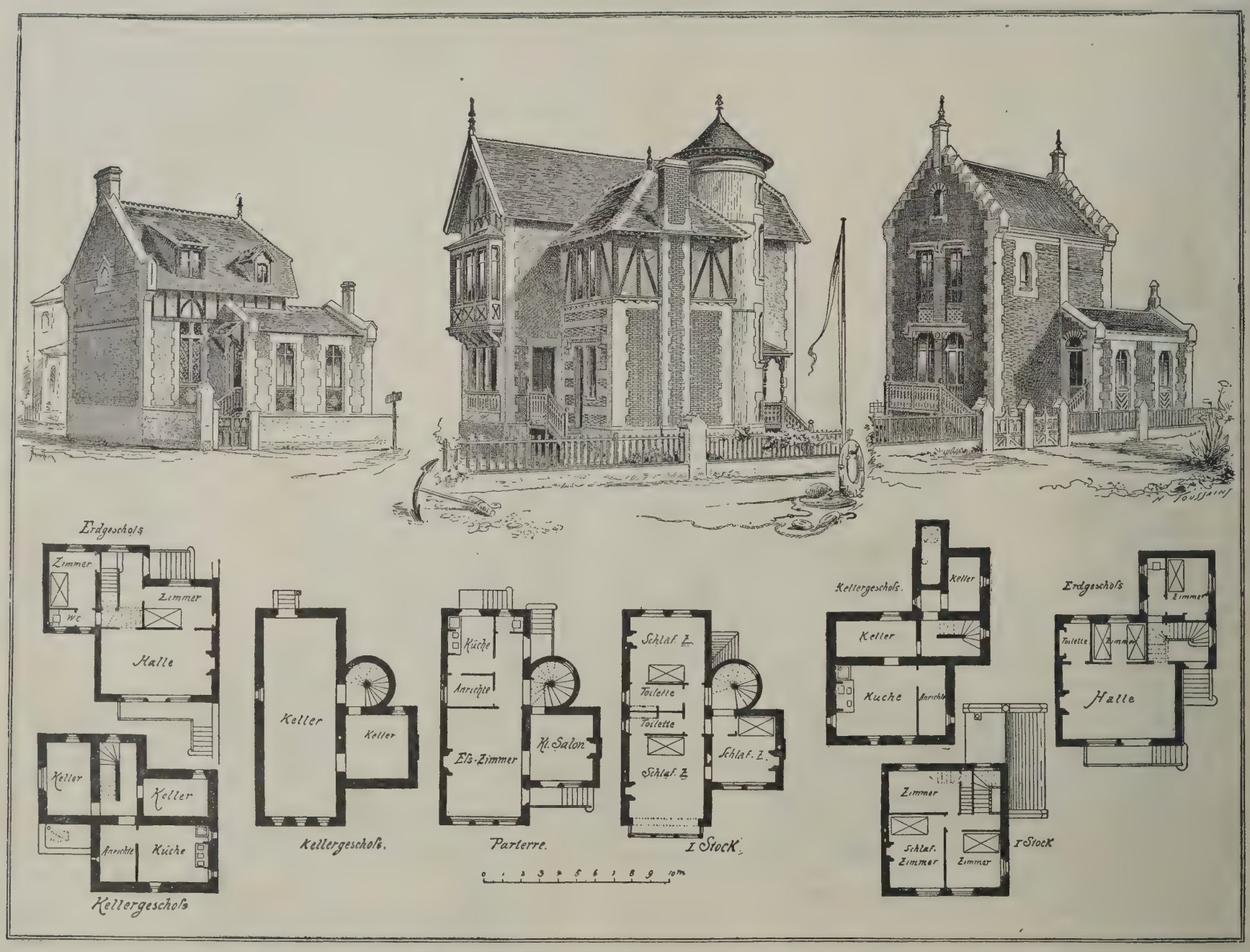
6. In all cases where extensions are made, care must be taken to break the pipe where the rule for sizes can be kept, and in no case must extensions be made from small pipe.

7. All openings must be closed with iron caps, and in no case will lead caps be allowed. No split pipe or broken fittings, repaired with cement or lead, will be allowed.

8. All pipes must be examined by the inspector of the company before being concealed, and due notice must be given by the fitter when any pipe is ready for inspection.

9. For churches, theaters, or public buildings, where large chandeliers, reflectors, or sun burners are to be used, the pipes must be of sufficient size.

It is the intention of the company to strictly enforce the above rules, and no certificate of inspection will be given when they are not complied with. To avoid trouble, architects and builders are requested to allow no bill for gas fitting unless accompanied by a certificate of inspection.—*Building.*

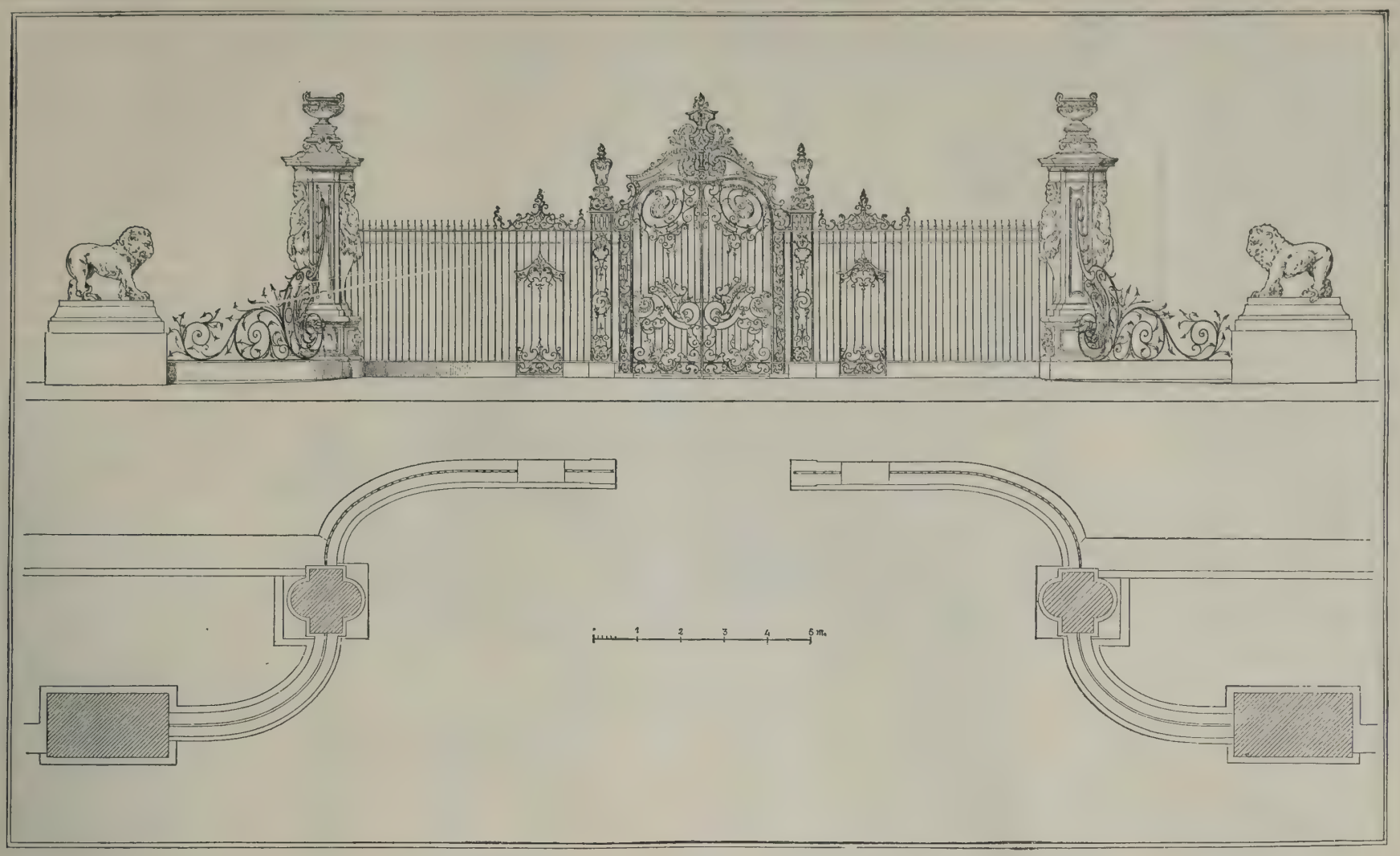


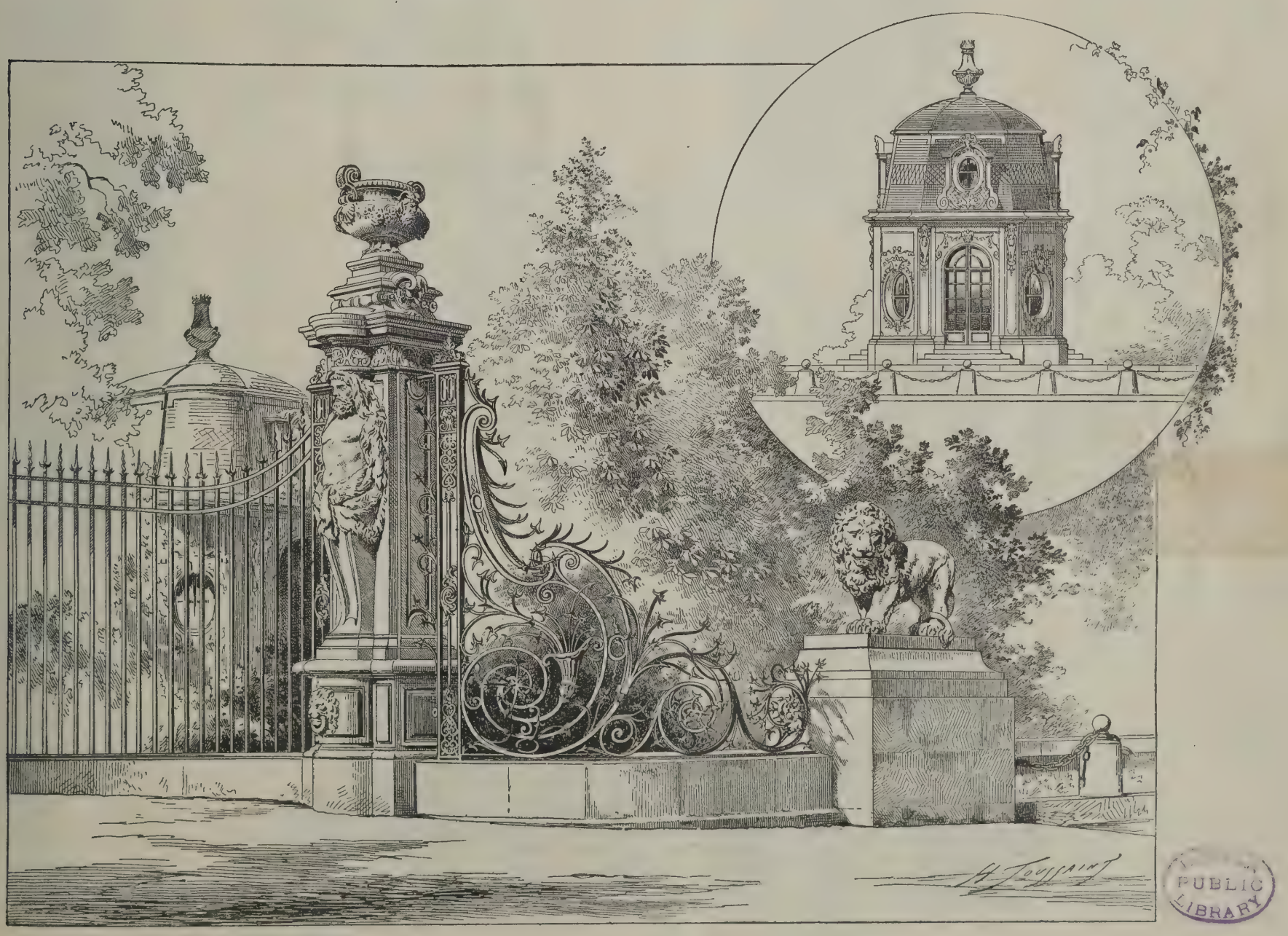
SEASIDE COTTAGES AT LION-SUR-MER, DEPARTMENT OF CALVADOS, FRANCE—M. MAGET, ARCHITECT.

Bichloride of Mercury as a Disinfectant.

Dr. Joseph Holt has the following to say about the use of bichloride of mercury as a disinfectant:

"It is a substance looking somewhat like common salt, exceedingly heavy and difficult to dissolve in water, unless previously mixed with an equal weight of muriate of ammonia. It is dissolved in clear water in the proportion of one part to one thousand parts of water, or about six ounces to forty gallons of the latter. This makes a colorless and ordorless solution, which, when sprinkled over the entire premises, both inside and outside of a house, cannot be distinguished from rain water except by a chemist. This dilution is perfectly safe to handle, and is in nowise dangerous unless swallowed. Unlike the horrid carbolic acid formerly in vogue, this is as inoffensive as rain water, so far as its effect upon sight or smell is concerned. Any article of clothing or bedding infected with an infection, such as yellow fever, scarlet fever, small-pox, or other disease transmissible in clothing or bedding, is at once rendered safe by the immediate destruction of the disease germs. In addition to this treatment of clothing, etc., in this manner, every floor of a house, whether carpeted or not, should be thoroughly sprinkled with the solution, omitting for late treatment that of the sick chamber itself. In the summer season the floor of the room could be lightly sprinkled or mopped without prejudice to the patient. There is no more positive way of preventing the spread of yellow fever or scarlet fever in a family than by such simple, easily applied and inoffensive methods as this. In order to prevent any one by mistake swallowing the solution, a little common bluing added to the water would put a person on his guard. Prior to July, 1884, the bichloride of mercury had come into use as a disinfectant dressing in surgery, having been introduced as such in the German hospitals. It quickly passed for similar use into England and America. Observing its effect as a surgical disinfectant agent, I argued that it must possess the same virtues if applied in municipal and maritime sanitation, and forthwith formulated the proportions and ordered its use at the quarantine station and in the city of New Orleans, at the same time discontinuing the use of carbolic acid. It was speedily adopted by San Francisco, where the information was republished and extensively circulated. It was next adopted by the United States marine hospital service, and has since become the universal disinfectant in fighting the great pestilential infections. For an accurate knowledge and appreciation of its value as a germicidal agent the world is indebted to the great German bacteriologist Koch, and in this country to Sternberg. I am very desirous that the valuable disinfecting quality of bichloride of mercury should be known and thoroughly understood by everybody, and I will certainly do all I can to disseminate the information throughout the world."





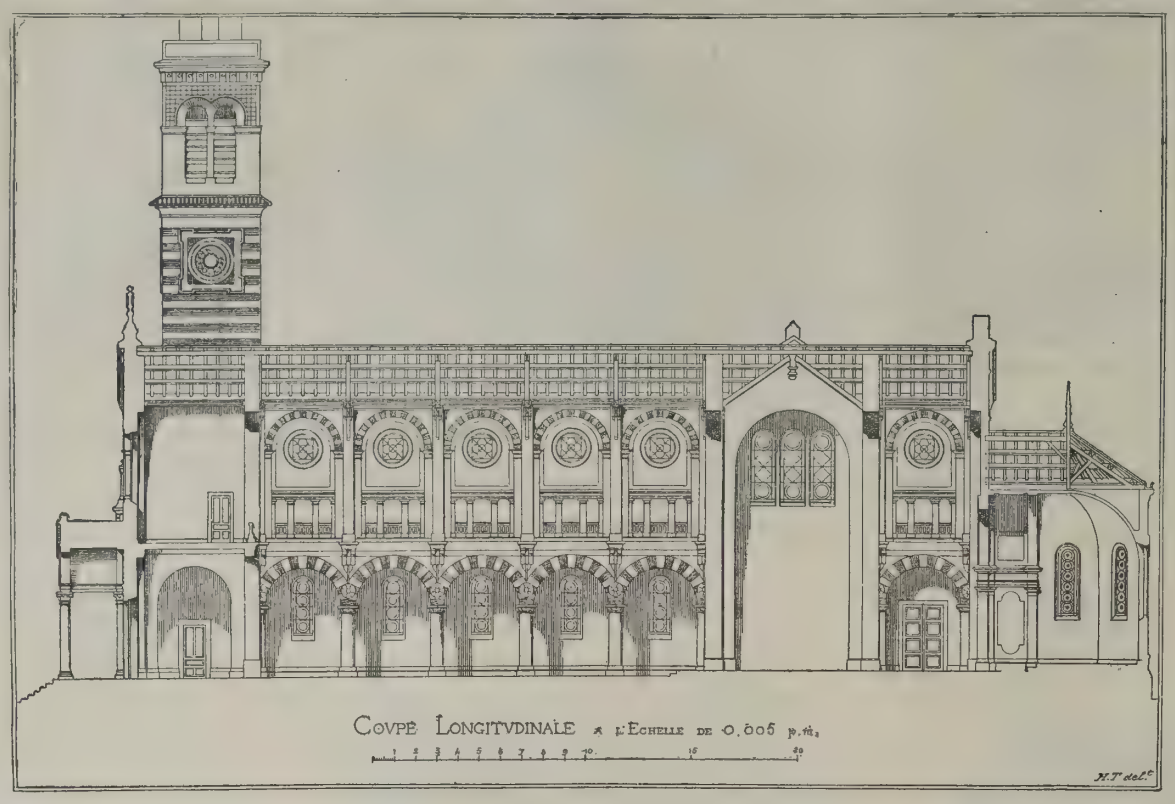
MAIN ENTRANCE GATE, CHATEAU AT BOUGIVAL—M. PASQUIER, ARCHITECT.

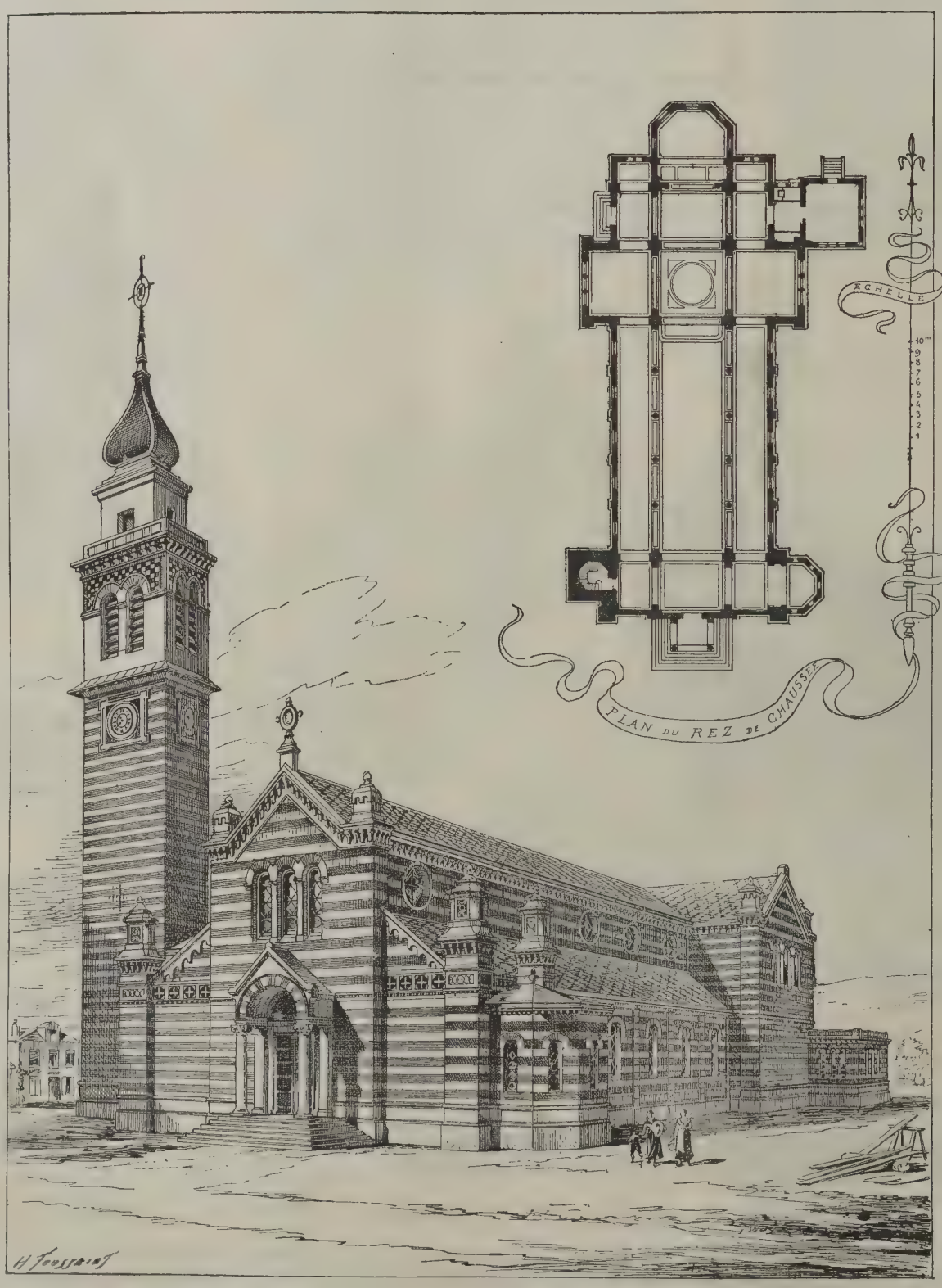
Chinese Brickmaking.

As the Chinese are excellent potters, it is not to be wondered at that they are also excellent brickmakers. This is sufficiently apparent, not only in respect to the perfect forms and durability of their common building bricks and tiles, but in the great variety of forms and different sizes of their brick. For common wall work in courses, their bricks in dimensions resemble those of Europe; but in so warm a climate as that of the south of China, many ornamental lozenged openings are required in the walls of houses to promote ventilation, and many ornamental projections, either vertical, horizontal, or curvilinear, are required by the national taste. To execute these features, the builder never need cut a brick. The proper forms are furnished by the brickmaker according to orders issued from the architect. Hence, there are moulded headers for plinths, beveled stretchers for sills, the same for lintels, etc. For mullions they have bricks of various sizes and designs, which fit as parts of the general structure with great exactness, whether as referable to ornamental effect or security of the building. Economy in all things is the ruling passion of the Chinese, and to this may be attributed the pains they bestow in preserving every particle of their brick earth, and saving the time of the builder, which would be lost in reducing his bricks to the required form, and which, it seems, they consider more than compensates for the expense of the moulds.—*James Main.*

CHURCH AT LA CAPELLE.

We give, from *La Construction Moderne*, views of the interesting church, of modern construction, at La Capelle, France, by M. Charles Garnier, architect. The original talent of this eminent architect will be at once recognized in the present work. The arrangement of the tower, its imposing effect and the style of decoration which characterizes the whole structure, show the resources which art may command to impart interest to a church whose dimensions and importance are in themselves rather restricted. The church in its greatest width is about 87 feet by 168 feet in length. Height of roof, 53 feet; tower, 175 feet, 16 feet square. Built in this country, it would cost about $75,000, and have about 1,100 seats.





CHURCH AT LA CAPELLE—M. CHARLES GARNIER, ARCHITECT.

The Long Leaf Pine.

BY THOMAS C. HARRIS.

That the pine is one of the most useful of all the trees common to the South Atlantic States, no one who has given the subject a thought will deny. In North Carolina there are found eight varieties of pines, of which the long leaf, or *Pinus Australis*, is the most useful, though confined to the eastern counties, and not to be seen west of the center of the State. Its range is from the southern counties of Virginia, all the way to Florida, and occupies most of the dry, sandy soil of those States.

In addition to the useful purposes to which this tree has been applied for many years, other uses and new commercial products have been of comparatively recent application. A brief enumeration of these will probably prove interesting.

It makes the best lumber for general purposes, and is commonly used all over the Union. It is from this pine that the turpentine gum is obtained, by chipping away the bark in spring, and allowing the gum to exude and flow down into a "box" or cavity cut to receive it. As is well known to every one, this gum is distilled, and the product is spirits of turpentine, the resin remaining in the still, from which it is drawn while hot into barrels. On cooling, it solidifies into a solid mass of brittle resin, or *colophony*.

There are some fourteen qualities of resin known to the trade, ranging from a coarse black resin to the finest pale amber colored, known as "window glass resin." The prices range from sixty-five cents to three dollars and a half per barrel, according to quality.

The rich, resinous wood and "lightwood knots" are split, and burned in a kiln, and produce the common tar. In the old-school geographies, this "tar, pitch, and turpentine" is set forth as a leading industry in North Carolina. From the fact that this tree is confined to the eastern counties, which were the first ones settled by white people, this statement was made with some degree of truth say a hundred years ago. Now it is but of small importance in the State. In South Carolina and Georgia it is a large industry. From the sap, leaves, and wood are made several forms of proprietary medicines, more or less useful in pulmonary complaints and for external use in the form of liniments.

Within the last few years, the leaves, or needles, have been first utilized, and put into salable forms. Previous to that time, they were occasionally used as a litter for barn yards, etc., for which they were not well adapted, on account of their non-absorbent character. Now the article known as pine hair, or pine fiber, is a new and growing industry. The needles are gathered in a green state, and steamed in a sheet iron vessel, through which the steam passes to a receiver, and is condensed into an oil having an agreeable balsamic odor and excellent antiseptic qualities. This oil forms the base of some of the best known liniments, and is highly esteemed as a domestic remedy for cuts, burns, bruises, and the like. After the steaming process, the needles are crimped by special machines into a close zigzag form for making mattresses, or are carded into a fiber for general upholstery purposes, to which it is finely adapted. In this form it closely resembles oakum, but is much more elastic.

Aside from its elasticity and cheapness for bedding, it has undoubted medicinal properties by inhalation of the pleasant balsamic odor, and the property of driving away insects, especially the *Cimex lecticularis*. The finer fiber is made into rolls of wadding for hospital use, taking the place of lint in surgical cases with decided advantage. The same fiber is also spun into yarn, and woven into a variety of carpets and matting for floors, and is cheap and popular.

The wood is subjected to a form of distillation by a new process, and produces wood spirit, creosote, "soluble pinoleum," tar and charcoal. From the smoke is produced lampblack. The creosote is used mainly for saturating piles, posts, bridge timbers, and cross ties, to prevent decay. When used on piles, it prevents the ravages of the *teredo*, which destroys so many wharves in Southern waters.

The cones, chips, and barks are sometimes saturated with low grade resin, and sold in barrels for kindling fires. The root has medicinal qualities also, and is sometimes so utilized. In the early spring the bark of the root has a sweet taste, and forms an important part of the food of the native "razor-back hogs" running at large in the forest.

In the dry, upland section, where this pine is the prevailing growth, it imparts some of its healing property to the atmosphere, supposed to be due to a high per cent. of ozone, making it specially beneficial to persons suffering from bronchial or pulmonary complaints. Thousands of well known cases of persons contracting these diseases in colder climates have been much benefited by a winter spent in these pine forests.

Thus we find, as the product of one kind of pine, lumber, shingles, crude turpentine, spirits of turpentine, resin, tar, pitch, lampblack, charcoal, oil from needles, crimped (mattress) needles, carded fiber or pine hair, wadding, carpets, bagging, wood spirit or alcohol, creosote, pinoleum, kindling, and numerous medical preparations. A very useful tree indeed.—*Popular Science News.*

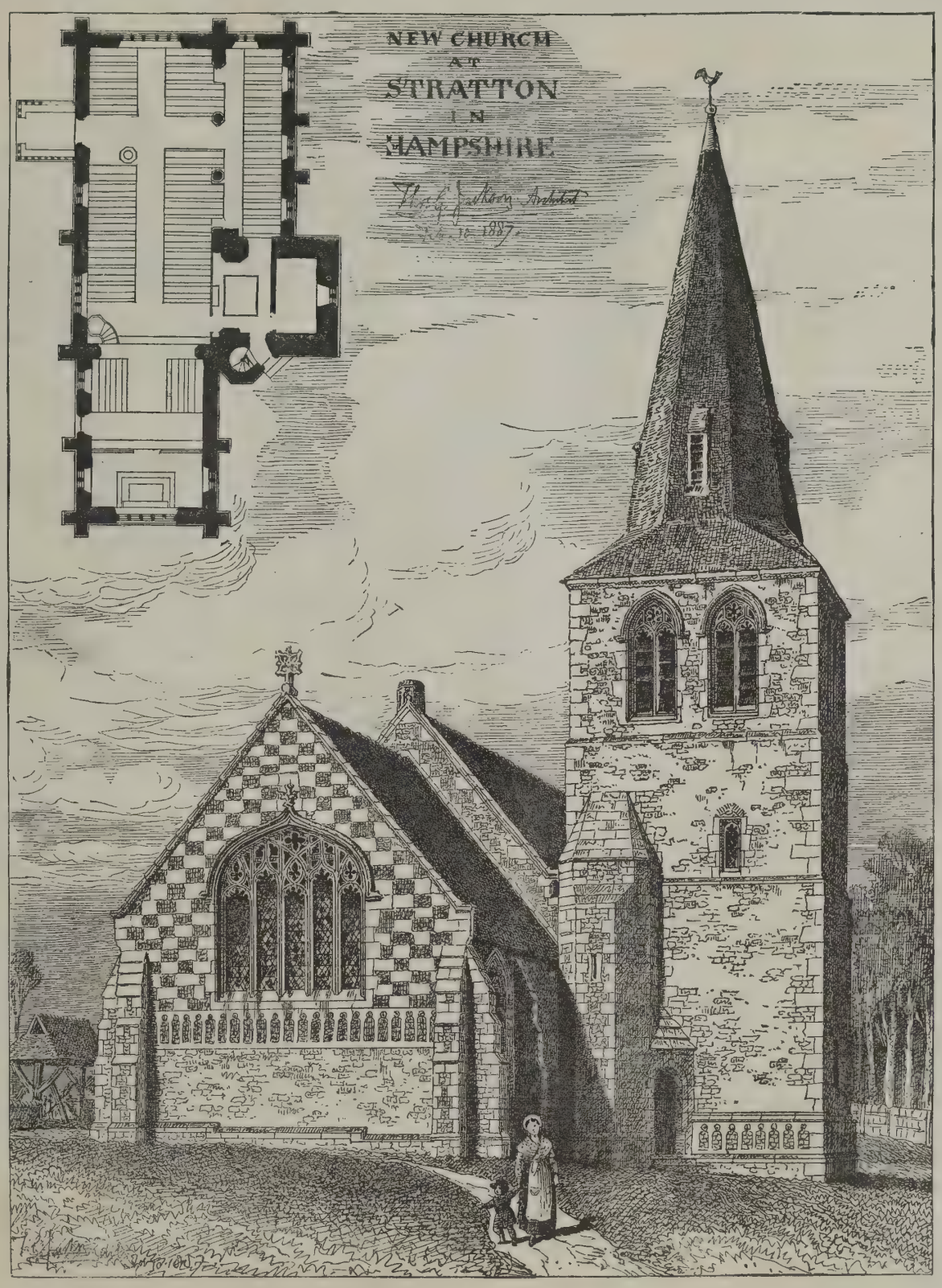
A HUNDRED-ACRE peat bog has been discovered near Ellendale, Dak.

CHURCH AT STRATTON.

The new church now being built from Mr. Jackson's designs at Stratton, in Hampshire, England, is to supersede a very mean modern structure of brick, which stands on low ground in Stratton Park. The new church, which is being erected at the expense of the Earl of Northbrook and the Hon. Francis Baring, is situated on higher ground nearer the village. The materials are brick with flint facings and dressings of Chilmark stone externally and of chalk internally. The spire is of timber and shingled. The seats and other fittings are to be of oak throughout.—*Building News.*

Decorative Notes.

In a handsome dining room finished in old oak, the high-backed oak dining chairs are upholstered in a manner that adds greatly to the beauty of the room: each chair shows a hand wrought back and seat embroidery in the old tapestry work which has recently been revived, and for which come the softest old colors in tapestry wools, and designs of charmingly quaint, mediæval style. The chairs under consideration each shows a different design of fruits and flowers: the pear, plum, grape, fig, pomegranate, apple, and orange and various conventional-looking flower and foliage forms furnishing the *motifs*, being expressed in the most delightful colorings, all subdued and softened as by time, on a ground of deep but rich blue; the quaint forms of the furniture and the rich color of the oak setting off the embroidery appropriately. The portieres in this room, which by the way is really an oaken room, having floor, walls, and ceiling in different tones of this wood, are worthy of mention, being unusual in their way—composed of a coarse, deep blue Irish linen, they are effectively ornamented by a powdering of heraldic-looking figures applied in a coarse, tawny yellow linen buttonholed to the blue linen by various colored polished Kells's threads; the ornament being the heraldic rose with the five petals displayed, and between them the barbs and seeds, the barbs and seeds being embroidered in old pink threads outlined by brown threads. The rose in each figure is set on a stiff stem, showing two stiff leaves on either side in a yellow green linen buttonholed with tawny yellow threads to the blue ground and veined with the same; the stems embroidered in old red threads. The frieze of each curtain shows simply a row of large heraldic roses without stems, in old pink linen buttonholed with tawny yellow threads, and set between two borders of curiously interlaced patterns worked in old reds, old blues, a faded green, and tawny yellow; these portieres are suspended by oaken rings from an old oak pole set in sockets under the lintel of the doorway which opens on the butler's pantry and other closets. The curtains in this room are also of the coarse blue linen, but show no decoration save a conventional frieze design of oranges and foliage in outline, worked in tawny yellows.



Some original portieres seen in a library in antique oak are of golden brown plush lined with old gold sateen; the ornamentation of the frieze is in colored leather. The design is a conventional sunflower border, treated in orange colored and olive bronze leathers, the brown centers worked in French knots in coarse brown silks, and the stems worked in couching and darning stitch boldly executed in heavy olive green filoselles; the large yellow petals of leather are blind stitched to the plush, and then couched in Japanese gold thread, the leaves in olive bronze leather are treated similarly, and the border as a whole is seen between narrow bands of heavy strands of yellow filoselles caught down by heavy brown silks; these portieres are suspended from heavy brass poles. Some book shelf curtains in the same room are also interesting, showing a conventional lotus frieze. These curtains are of fine dark old red cloth, on which is applied a frieze band of old red silk sheeting, showing a running conventional lotus pattern, the flower worked solidly in dull blues and olives against a background of olive formed by the leaves, the curving stems of which and of the flower are worked in brown reds. These curtains harmonize beautifully with the old oak of the book shelves and other furnishings. In this room the window curtains are of rich old red Taikun without ornamentation, the rich, lustrous surface of the fabric being sufficiently handsome.

In an ivory white and gold parlor, an attractive feature is the ornamentation of some small curtains hanging in front of the open cabinets at either end of the over-mantel. These curtains are composed of pale old pink Henri Deux armure, the pattern of which, of graduated circles, is followed in couching of silver thread, forming a silver and rose curtain of very chaste and delicate effect, suiting well with the ivory white woodwork. The shelves of these cabinets are lined with an old pink plush, showing a silvery bloom in keeping with the curtains. Another cabinet in this room has curtains of East Indian embroidery in gold, on a creamy cotton ground, between an upper and lower band of old pink plush. The window curtains in this parlor are of pale blue Henri Deux armure, and show deep friezes of pale blue plush, on which appears a design of interlacing disks couched in outline with silver cord, the disks being boldly darned in pale old pink, silver green, and lemon yellow filoselles alternately. The carpet in this room is a Wilton of French Renaissance scroll pattern in warm drabs, on an old gold ground, light, yet rich, in its effect, which resembles the silver and gold Florentine tapestries.

An exceedingly rich mantel valance in a handsome drawing room is composed of silk velours of a dull but warm purple shade, set between two bands of Irish crochet in raw linen thread laid over the rest of the plush, which throws its pattern out in fine relief. The lower band of crochet is finished at the bottom with leaf points, making a lace finish. By the tip of each point is suspended a rich tassel of dull purple silks and raw linen thread, with heading of silver threads. This lace bears no resemblance to the ordinary crochet and has not been, like it, commonized by constant use. To gain its most pleasing effect it must be done in the deep, warm-toned raw linen threads. In this same room the portieres of the same shade show a broad frieze insertion in the same quaint old lace, treated even more boldly than the valance insertions, or rather overlays of the same lace. A very rich effect is gained in a pair of sofa cushions made for a white and gold tete-a-tete sofa, the outer covering being formed of English point in gold threads and braids; the pattern, an ornate rose and foliage pattern, is richly thrown up by an inner cushion cover of rich pink Roman satin. The small sofa has a tufted seat cushion in pink and gold brocade, and these cushions stand upright at either end. In this same room a wall curtain over a satinwood upright piano is composed of pink satin damask, the figure of which is followed in gold thread with very chaste and rich effect.

A table, made by the village carpenter, and covered and decorated by the ladies in the house, is now in use in a Newport drawing room, occupying the center of the room. It is rather large, has a circular top, and four straight legs, inclining outward. A flat piece, about fourteen inches wide, is placed against the legs, about six inches from the floor, forming a sort of square dado or wainscoting around the table. This piece has three round openings in each of the four sides. It is covered, as are also the legs and top, with rich maroon silk plush, drawn tightly, and nailed with small tacks. A deep ball fringe of maroon color edges the top, and is put on with small gilt tacks. Pretty blue and white china plates are inserted in the openings, and a lovely lamp, of blue and white china, stands upon the table.

A rich and effective cover for a small table is a square of dark red or maroon plush, unlined, but trimmed with a wide fringe of gold or maroon silk tassels. When this is placed upon the table, the cloth is drawn up on each side to the top, making an irregular festoon, and is fastened there by a bow of gold-colored satin ribbon.—*Art Interchange.*

New Galvanizing Process.

Johann Arthur, of Rietz, has invented the following process for coating iron with zinc. The tank containing the bath of melted lead and zinc is divided into two compartments by a refractory partition, strengthened by iron framework. This partition does not reach the bottom, so that the metals are kept in fusion, as it were, in two communicating vessels. The objects to be galvanized are first passed through the melted lead, then, passing along the bottom, come into contact with the zinc, which fills the other division of the tank, so that the objects are heated out of contact with the air. The bath of zinc can thus be kept low, thus avoiding oxidation, while the objects receive a thin and highly resistant coating of zinc.—*L'Industria.*

EARTHQUAKE FOUNDATIONS.

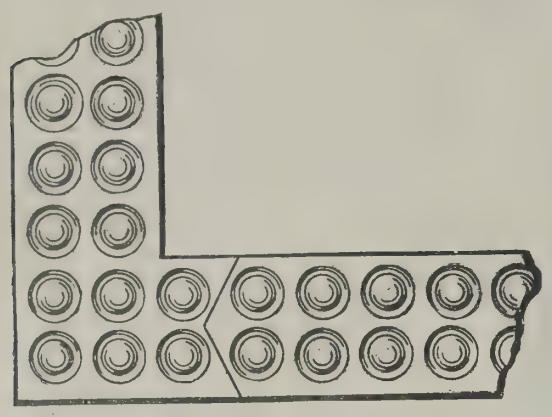
To the Editor of the Scientific American:

I send plans of constructing foundation of buildings, which, if employed, I believe, would save a house or any structure from damage by an earthquake of ordinary violence.

The idea is quite simple, so that little explanation of the plans is necessary to a full comprehension of them.

The structure above the foundation rests on steel balls. These balls are inclosed between two iron plates or castings.

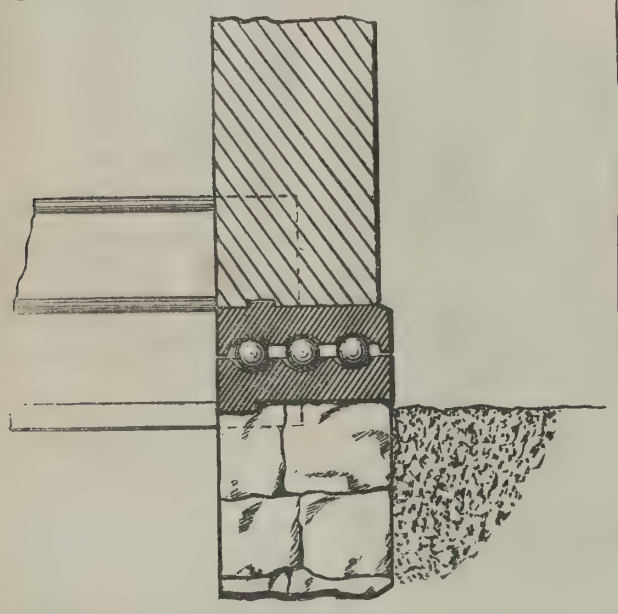
I have supposed that an earthquake would not damage the foundation of a building, provided the grade comes up to the top of what is called the "foundation wall," or if it is otherwise strongly braced; and that if some mode of construction could be employed which would permit the foundation to be moved suddenly in any lateral direction without carrying with it



the structure above, damage by earthquake would be largely if not wholly obviated.

The weight that each ball, according to my plan, would have to bear is represented by a surface of only six inches square. To look at it from another point of view, each ball has to bear as much weight as a layer of mortar six inches square. The weight of massive structures seems to be the main object to be contended with, and it seems that in every case the balls would be more than strong enough to perform their part. The more massive the structure, the thicker must be the foundation. This method of construction can be applied to any form of building.

Braces and binding bolts would be needed that I have not shown in the plans. They should in most cases be secured to the metal plates from parts projecting to receive them. To secure the metal plates both above and below the balls, as well as the balls themselves from rust, it might only be necessary that paint and paraffine should be used. A coat of paraffine alone



would, in all probability, prevent rusting for ages. The opening represented between the edges of the two courses of plates by the letter A, on the full size vertical section, should be pointed with mortar, thus excluding the rain and moisture.

I have supposed iron to be used for stays, braces and joists. If wood should be used for joists, a special arrangement would have to be provided for securing them to the metal plates.

It is probable that a wrought ball of steel would resist more pressure than one cast. Ben. Hill.

Tiona, Warren Co., Pa.

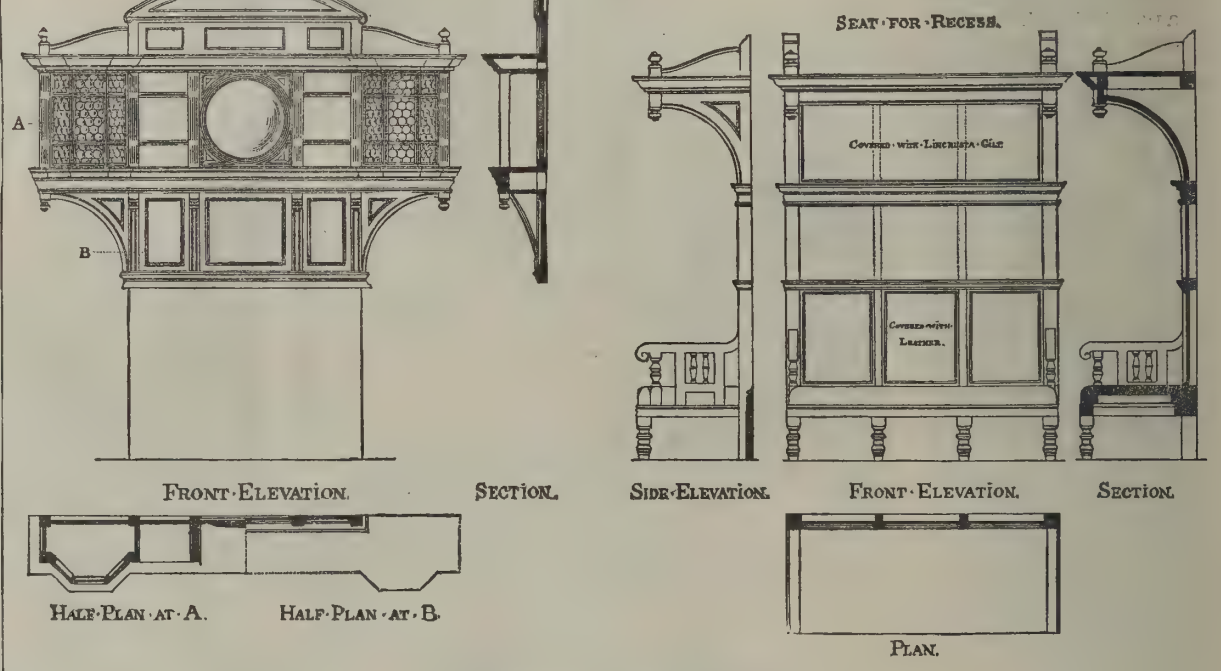
Remarks.—The above plan is practicable, although not new or untried. The noted engineer D. A. Stevenson was the first one to announce the principle of the aseismic joint (see a paper by him in the "Transactions of the Royal Scottish Society of Arts," 1868, vol. vii., p. 557, entitled "Notice of aseismatic arrangements adapted to structures in countries subject to earthquake shocks"). An ordinary Japanese house consists of wooden uprights resting on rough round stones (see article upon floors and ceilings, by C. P. Karr, in our paper), which are virtually aseismatic joints; but the roughness prevents any lateral movement from a slight oscillation. The size of the balls shown in the plans submitted are too large. Any movement within a house resting upon such large balls would cause a violent oscillation of the whole structure, with damage to the furniture, etc. The balls should be reduced to the size of buckshot. Mr. H. S. Ridings, formerly Resident Engineer of the Iquique Railway, Peru, has proposed a simple, cheaper, and effective plan of free foundations, viz: To interpolate a layer of clean, coarse sand one inch thick, in a convenient position, care being taken to prevent it escaping laterally and from being washed out. The free movement foundation principle is admirably adapted to resist horizontal oscillations, which seem to be the most destructive because most common, but the ball arrangement would not provide for vertical oscillation, in fact, it would be detrimental as lessening the inertia of the building. The plan is an excellent one to support a heavy roof upon, but not a light roof, for the latter might be lifted off by a cyclone. The detail instruction about pointing up the interstices with mortar between the foundation and the superstructure would invalidate the whole plan of a free foundation. Instead of being pointed up, an iron collar should be bolted on to the upper side of the iron beam and come down over the lower beam, not touching the latter and hiding the joint and protect it from the weather. The supposition that an earthquake would not damage the foundations of a building will only hold good when that foundation is of the heaviest and most substantial nature, and built at the very least ten feet below the natural surface.—Eds.

Care in Respect to Fire.

It is wonderful how some property owners hang back when a suggestion is made looking to the safety of their property by the adoption of some simple safeguard. "Am I bound to put in buckets of water?" "Is my insurance vitiated if I don't put them in?" "What reduction will you make in my rate if I do?" It never seems to strike them that it is worth while to make themselves as secure as possible against fire on their own account. It never seems to enter their heads that every establishment that is burned for the lack of ordinary safeguards is being paid for in their present rate. It never seems to occur to them that if the merchants refuse to help to reduce the fire loss, the rates must stay where they are or go up. Above all, it never seems to occur to them that they must pay all the losses, and that the insurance companies are only the agents to collect the money from them. And they can't escape it, either, any more than they can escape any other relation modern society has prepared for them.—*St. Louis Examiner.*

A SIDEBOARD IN WALNUT.

This sideboard is of walnut, the side-projecting cupboard doors being filled with lead glazing, the centers being of beveled glass, and the lead work gilt. Behind the balusters to the top cupboards silvered glass is placed. The sideboard was designed by Mr. R. A. Briggs, London.—*Building News.*



A SIDEBOARD IN WALNUT.

THE PHILIPPINE EXHIBITION AT MADRID.

Among the richest possessions of the Spanish empire are the Philippine Islands, long celebrated for the great variety and value of their products.

An exposition of the principal productions of these islands has lately been inaugurated in Madrid. We present herewith a view of the exposition building, which consists of a light and graceful pavilion of iron and glass, 175 feet long, 90 feet wide, and 80 feet high at the cupola. It has an elegant front, with a fine stairway, and a portal supported on Grecian columns. Ricardo Velazquez was the architect, well known for many excellent works. It was opened on the 30th of June last with great pomp, by her Majesty the Queen Regent.

Among those present were a large number of the aboriginal inhabitants, Philippians, dressed in their native costumes. They presented a rare and attractive appearance. The objects exhibited show the various forms of dwellings of the aborigines. These for the most part consist of cabins or huts mounted on posts at a considerable elevation above the ground.

One of the tribes has a dwelling arranged upon a tree top 30 feet high.

NEW EXHIBITION BUILDING OF GLASS AND IRON, AT MADRID.

A great variety of interesting objects are collected, illustrating the manners and customs of the natives, their manufactures, forest and other productions, fauna, etc.

In future the exhibition building, which is located in the park of Madrid, is to serve as a permanent colonial museum.

Finger Nail Paint.

How to clean the paint and putty from under the finger nails, so as to have them free from all impurities, is a question that often puzzles some painters. It is a well-known fact that more trouble arises from heedlessness in this respect than from almost any other source. In a painter's experience, you often hear the remark made: "We know he is a slouch; why, just look at his nails." And nothing looks so untidy as dirty finger nails. A very good plan, and one that is easily carried out, is to get a stiff tooth brush and a little water, drop a small quantity of ammonia into it, and then use the brush, rubbing well the ends of the fingers. You can wash them off with white castile soap afterward. The ammonia whitens the skin, and takes the yellow stain out, caused by the absorption of the oil into the pores. We are decidedly of the opinion that it is more preferable than just the soap alone, as we have tried both. The ammonia need not be used so strong as to cause the fingers to become sore, or to injure them in any way; just enough to eat the paint or varnish, or whatever has become accumulated there.—*Carriage Monthly.*

Healthy Habitations and Defective House Construction.

An absolutely perfectly constructed dwelling does not exist so-day! This is rather strong language, or assertion, but it nevertheless is true. Science teaches us that to have an absolutely healthy dwelling, we must have uncontaminated air to breathe. Are our present-day houses constructed to guarantee this?

We propose to speak of defects, not strictly applicable to plumbing; but realizing the necessity for other branches in the architectural line to advance with the present-day sanitary improvements, we propose to point out a few glaring defects that plumbers are not responsible for, and many times are unjustifiably held accountable for.

The first defect we desire to call attention to in the present-day mode of house construction is the enormous amount of dead air space in each and every dwelling. To more clearly make this understood, we will designate every empty, unventilated space in any portion of a house, dead air, life-destroying elements that prevail to an alarming degree in every house, as constructed at the present time. These dead air spaces are between floors and ceilings, partitions, hanging ceilings and roof, recesses in party and side walls, front and rear walls, unused flues, under the steps of stairways, under stoops, around plumbing fixtures. The latter we have condemned before, until now fixtures are left open with no casings. This guarantees cleanliness in this particular, and pure air.

The dead air space in sliding-door partitions, dumb waiters, passageways, alcove rooms, and last, but greatest of all evils, unventilated closets, soiled clothes receptacles, etc.

Show us a house, to-day, without these defects, and we will acknowledge you have a healthy house to live in. We care not how well we plumb or how expensive the plumbing fixtures are, if the house construction is defective, with thousands of cubic feet of dead air spaces, as mentioned, the good plumbing will often be condemned in consequence of these glaring architectural defects.

The remedy lies in every architect's hands. Who will be the first to institute it?—*Plumbers' Trade Journal.*

Ivory, Silk, and Gold.

The most elaborate example of interior decoration work lately designed in New York has just gone on, says the *Star* of this city, to embellish the San Francisco home of ex-Senator J. B. Flood. The house, which is only two stories high, is in all its parts a wonder of Louis Quinze and *rococo* magnificence; but a boudoir in ivory, silk, and gold, on the second floor, is mentioned as a special bit of luxurious art. This room, which opens from a hall in English oak, arranged as a picture gallery, connects two bedrooms reached from opposite sides. The woodwork is in enameled cherry, with a wainscot three and a half feet high; a border of the wood, with its gilded decoration, marks also the division between wall and cove. This band is on a line and uniting with the upper section of the door frame, which bears the distinction of a handsome piece of carved work.

The walls are covered by hangings of satin damask laid on plain, showing a floriated scroll pattern in tints of blue and pearl. The wide covering is adorned in hand modeled relief, the design showing a continuous lattice work with interlacing vines, and the figures of dancing Cupids breaking through at intervals. Above this is a moulding indicating an oval, and connected with spandrels filled by wreaths. By the introduction of a colonnade an open sky effect is produced in the ceiling with its height of eighteen feet. The perspective, in which the balustrade surrounding this central oval is treated, is enhanced by the added adornment of vines trailing over the rail.

A distinctive feature of the room consists of two wall brackets or cabinets in framing of ivory and gold, with delicate lines in brass work forming a border inclosing beveled glasses around a center mirror. The furniture, of Louis XV. style, is upholstered in silk lampas with exquisite bright figurings on a pearl tinted ground. The doorway hangings are of plush in a pineapple shade, richly embroidered in *appliqué* and with silks of different shades and ribbons in combination. The covering of a white table at one side is made to correspond. A crystal chandelier hung above the doorway is supplied with candles to illuminate so fair a scene in a fortunate man's habitation.

Frosted Glass.

To give glass an appearance as if covered with frost, brush over the surface of it a concentrated solution of sulphate of zinc in water to which a little gum has been added.

ST. GEORGES VILLA AT SAINT LO.

St. Georges villa originally comprised but one parlor, a dining room, and a kitchen on the ground floor, three bed rooms in the first story, and various secondary rooms in the attic. Upon the whole, it was a small dwelling that it was desired to turn to account in a general project looking to the comfortable installation of quite a large family.

Admirably situated, moreover, upon a high hill, it faces in such a direction that one can take in at a glance the picturesque grouping of the houses of Saint Lo around the cathedral and the long perspective of the valley of the Vire to the west. The annex buildings, therefore, could not be allowed to hide this view; on the contrary, it was logical to arrange them so as to take every advantage of the latter.

This explains the longitudinal extension of the present villa, which, on the ground flour, comprises a dining room, a parlor, a library, a winter garden, and a billiard room, connected by a glazed gallery forming a covered terrace.

In the wing to the left are the kitchen and its dependencies, the servants' dining room, servants' stairway, etc. In a pavilion to the right there is a study and the main staircase

The upper stories contain ten bed rooms, with toilet rooms, water closet, bath room, etc. The attic contains a large number of servants' rooms.

Stalls for five horses, a room for coaches, a laundry, and quarters for the gardener are arranged in a special building.

The main rooms are heated by a hot air stove, and the heat of the kitchen furnace is utilized for warming the atmosphere of three rooms in the upper stories.

The masonry work was executed with the schistose ashlar of the country, laid in Airal mortar of hydraulic lime. The bricks likewise came from Airal.—*La Construction Moderne.*

VILLA S^T GEORGES à S^T Lô (Manche)_ARCH.^TE M. CAMUT.

The Effect of Sea Water on Concrete.

Those who use Portland cement concrete will be interested in the discovery to which the *Scotsman* drew attention recently. It appears that the Aberdeen harbor sea works have suffered considerably. The concrete blocks have been seriously affected by the sea, and the authorities have been rather puzzled to account for its destructive action. Very great reliance has been hitherto placed by engineers and architects on Portland cement concrete; but this good opinion has been somewhat shaken, if all that we hear of certain hydraulic works can be substantiated. We take our information from recent accounts that have come to us. Indications

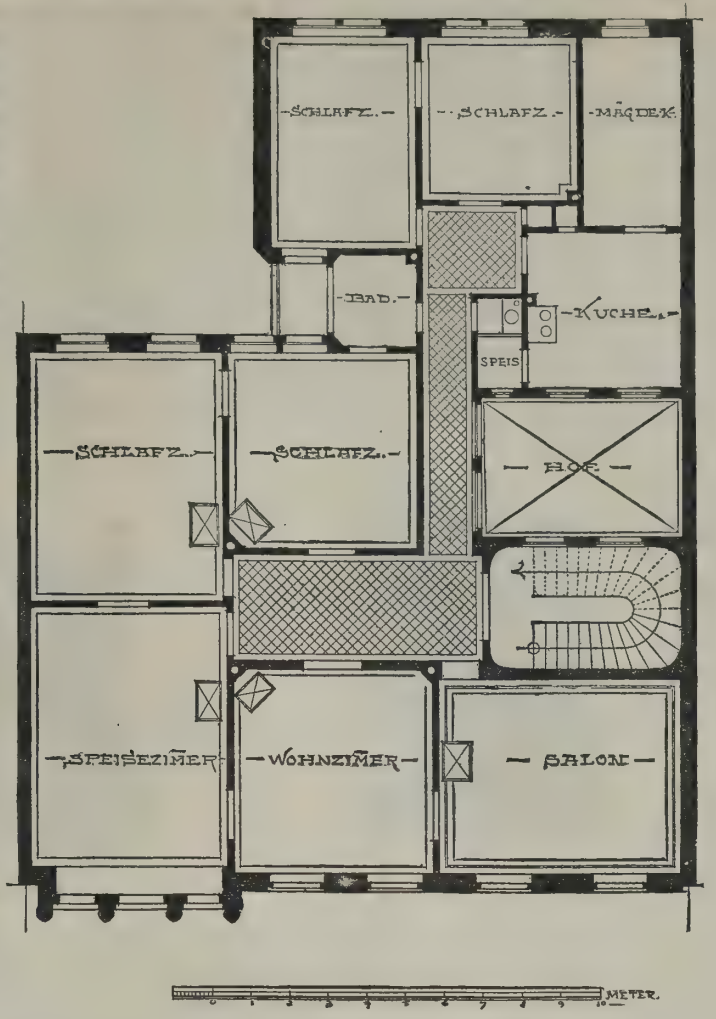
As frequently the case in the country, water derived from rains is collected either in cisterns or reservoirs, from which it is distributed to the various stories. Iron plate reservoirs of a capacity of 3,280 gallons, placed in the upper part of the pavilion to the right, above the grand staircase, receive water from a well in the kitchen. The water is forced up by a pulsometer actuated by a small vertical generator. This system gives the best results With a minimum expenditure of coal, water is forced to a height of 60 feet to supply the reservoirs.

of failure have been observed for some time in important sea walls constructed of concrete, and the Aberdeen harbor works, if what we learn is true, confirm the misgivings which are entertained. The action of sea water on concrete has been suspected of late years; but up to this time a satisfactory explanation of the damage sustained has not been given. Experiments have been recently made by direction of the Aberdeen authorities by Professor Brazier, of Aberdeen University, and Mr. William Smith, the harbor engineer. The decayed concrete has been ascribed to the force of the sea and wind, though the action was chiefly noticeable in the graving dock in still water.

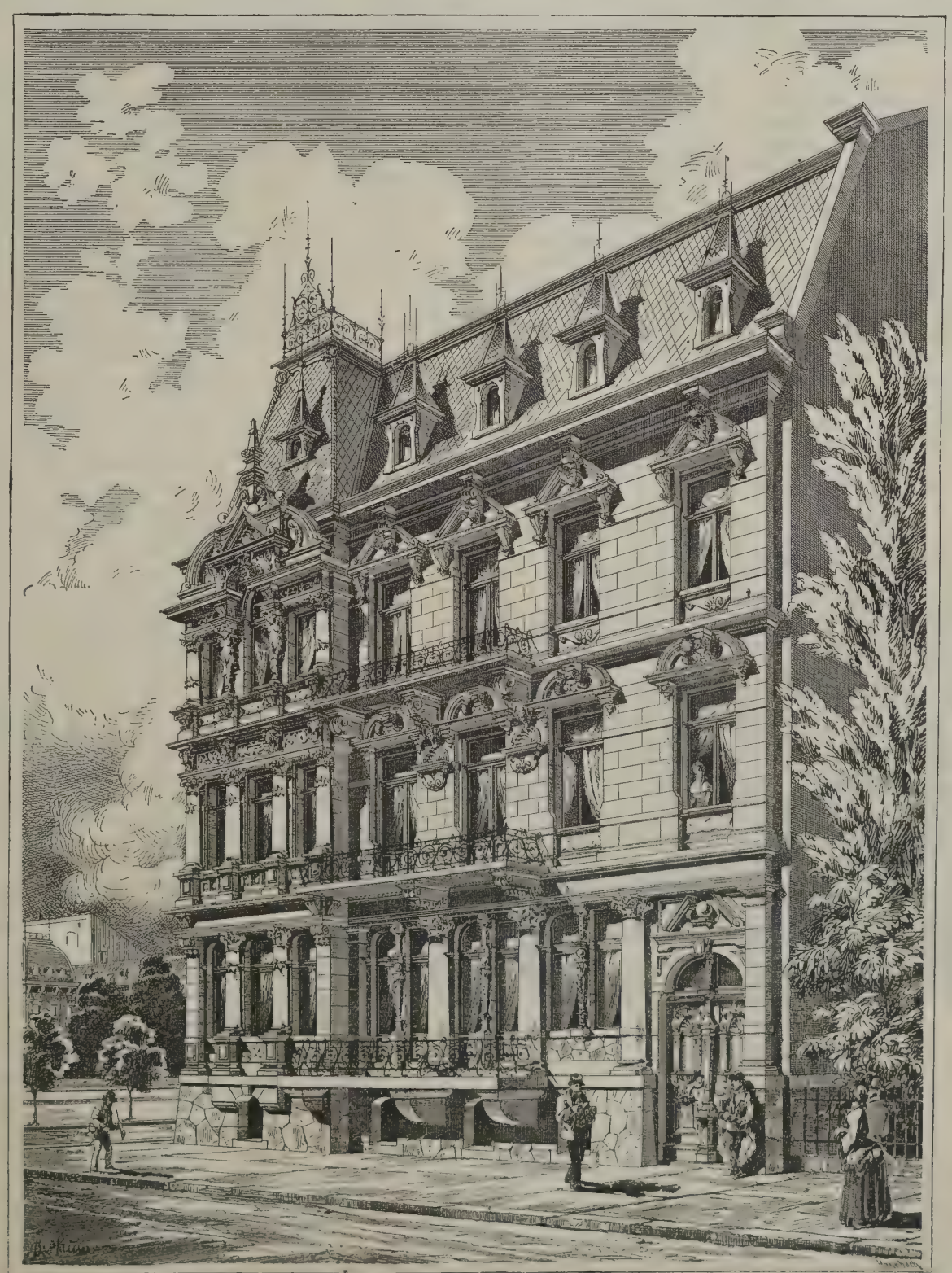
The writer in the *Scotsman* says:

"It is the action of the sea water under pressure in still water that has rendered the nature of the damage in the present instance so conspicuous" The quay walls and breakwater were constructed fifteen years ago, the graving dock two years ago, and in all these works a disintegration of the surface of the concrete by the chemical action of the salt water has been going on. The entrance walls are said to be built of Portland cement concrete, composed of one measure of cement, two measures of sand, and three measures of stones, with large rubble stones incorporated in the walls. The wall surface is plastered with Portland cement mortar up to 3 ft. of low water, the mortar being made of one measure of Portland cement and one of sand. The upper part of wall is faced with granite.

During the process of emptying the water from the graving dock, a hydraulic pressure varying with the tides of from 5 lb. to 11 lb. per square inch is put on this concrete skin, the water forcing its way through the pores of the skin, producing cracks and saturating the quay walls. The chemical action is hastened in proportion to the exposure, and is increased by the passage of water through the body of concrete. Various injuries are reported—*e. g.*, the joints of the ashlar facing have opened in parts, owing to the loosening of the concrete surface beneath. The engineer consulted Professor Brazier. Test briquettes were prepared for analysis with a view of discovering the proportion of magnesia contained, and which was supposed to account for the damage. The Portland cement, it was found, had not contained more than one-half per cent. of magnesia, whereas the decayed concretes showed an increase in the quantity of hydrate of magnesia of 13½, 15, 22, and in one case as much as 40 per cent. This could only have been derived from the sea water. Another deleterious substance found in the decayed concrete was carbonate of lime, which could hardly be traced in the Portland cement of the same standard. The concrete taken from the south breakwater showed it to have undergone a similar chemical change. The outer quay walls surrounding the side of the graving dock were built of plastic concrete or Portland cement concrete, mixed in the usual way with a certain quantity of water, and allowed to set two to four hours, then broken up and deposited within frames under water in skips with opening bottoms, the concrete being left *in situ* in the frame. These walls do not show the same action or decay. Portions have been rebuilt with Roman cement concrete under water, but no decay has been noticed in them, and the only protection to the Portland cement concrete from the chemical action of the sea is apparently a non-porous lining or facing of stone-work. Every care is said to have been taken in the concrete used. The cement had withstood the mechanical tests, and the concrete had set hard. The same failure of Portland cement concrete was noticed by Mr. Harrison Hayter, vice-president of the Institution of Civil Engineers, two years ago. After a time the concrete expanded, vertical walls of the material lifted some inches, and the surface cracked and flaked off. In every case a white "cream like" substance was observed in the concrete, which Mr. Hayter had analyzed, and was found to contain 80 per cent. of magnesia hydrate, consisting of about two-thirds magnesia oxide and one-third water. In every case of decayed concrete, magnesia was present. Professor Brazier's experiments are confirmatory of the fact that these deposits of decayed cements contain magnesia, but he believes the substance comes from the action of the sea water, and is not present in the Portland cement, as Mr. Hayter thought to be the case. We cannot enter into the details of the experiments made by Prof. Brazier on the cement blocks, and the results he obtained by digesting some of the cement in sea water, from which it appears that the amount of lime and magnesia contained in the sea water in its original state is accounted for after the cement had been separated from the water, there being a gain of lime and a loss of magnesia amounting to nearly all the magnesia contained in the sea water. Hence the same authority concludes that Portland cement cannot resist the action of sea water.—*Building News.*



SECOND FLOOR PLAN—CITY RESIDENCE, MANNHEIM.



A CITY RESIDENCE IN MANNHEIM—WERLE & HARTMANN, ARCHITECTS.
From Architektonische Rundschau.

Vassar College Sewerage.

Vassar College, Poughkeepsie, N. Y., has a system of sewage disposal for its 2,000 of population that might well engage the attention of sanitarians the world over. It is simply the dry earth system, and is represented by those concerned to be perfectly successful, inoffensive, and inexpensive. It is also extremely simple; consisting merely of two large but shallow tanks (for alternate filling and emptying), the bottom guttered for the effluent, and covered with a layer of gravel.

Above this gravel bed is a loose flooring of boards, on which is spread a thick layer of soil from the college farm. The sewage from all the buildings flows into one of these tanks, distributed over the area of the soil filter, so long as the effluent passes off clear, into a neighboring stream. When the effluent grows impure, the sewage is turned into the other tank, and the workmen employed on the college farm shovel out the muck created by the mixture of organic matter and soil, and cart it back to the fields to be replaced by a fresh layer therefrom. So powerful and rapid is the bacterial digestion and the absorption of the disengaged products by the salts, carbon, etc., of the soil, that it is asserted, and credibly, that no offensive odors are experienced either from the effluent or in the removal of the muck. The organic matter is so far decomposed and assimilated with soil in the average time of its stay in the bed as to be ready for almost immediate absorption by vegetation, and the fertility produced is said to be most exuberant.

Where there are contiguous farms sufficient to utilize the sewage of any community, it is not easy to imagine anything either simpler, cheaper, or more perfect than this plan. Within a reasonable distance farmers would gladly cart in their soil for the privilege of carting it away again as a rich fertilizer.—*Sanitary Era.*

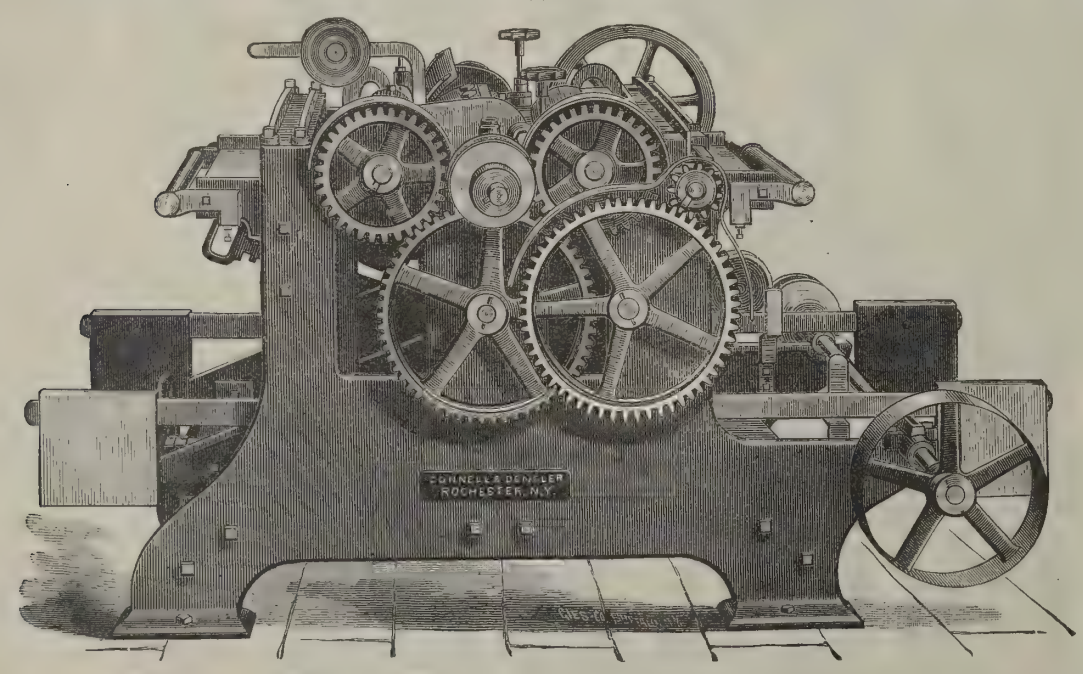
Preservation of Stone.

Limestones are for many reasons eminently suitable for constructive purposes, being cheap and easily worked, but they readily absorb moisture. This, as it usually contains carbonic acid, gradually dissolves away the material of the stone, and in winter serious injury is often caused by the freezing of this water and its consequent expansion. Several methods of rendering this material less porous have been proposed, but not unfrequently the remedy has been worse than the disease. Alkaline silicates were at one time in favor for this purpose, but in its application soluble hygroscopic alkaline carbonates are formed, which seriously affect the utility of the process. Moreover, unless care is taken in the application of these silicates, a hard, impervious varnish is given to the surface of the stone, within which the water used in dissolving the silicates is imprisoned, and on the first frost serious disintegration takes place. MM. Faure and Kessler have recently been at work on this question, and as the result of their experiments, recommend the use of metallic fluosilicates, more especially those of aluminum, magnesium, or zinc. The surfaces to be treated are brushed over with a solution of the salt chosen, causing on the first application an abundant froth, due to the liberation of carbonic acid gas. When dry the operation is repeated once or twice, depending on the quality of stone; on an average for soft stones 1·7 lb. of solution at 40° Baumé are required per cubic yard. The advantages claimed are: That the process is completed in twenty-four hours; it allows the stone to be polished, and by a suitable choice of fluosilicate used, different colors can be communicated to it; and lastly, the process is cheap, and applicable not only to stone, but to all cements and mortars containing lime. The theory of the process is that a double decomposition occurs, forming in the first place silica, calcium, and aluminium fluorides and carbonic acid gas; secondly, a reaction takes place between the limestone and the aluminum fluorides, producing alumina, calcium fluoride, and carbonic acid. In this manner each grain of the limestone is covered with an insoluble coat, materially increasing its resistance to atmospheric influences.

AN IMPROVED SURFACE PLANING MACHINE.

A strong and compact planing machine, of moderate cost, and embodying many late improvements, is shown in the accompanying illustration, and is manufactured by Messrs. Connell & Dengler, of Rochester, N. Y. It can be made to plane as wide as thirty inches, will plane very short stuff and not chip the ends, and will make so fine a surface that it is an especially desirable machine for furniture manufacturers, making the stuff ready to go through the sanding machine. The bed plate, containing the lower feed rolls, can be raised and lowered, for various thicknesses of stuff, by means of inclined sides, which gives it a solid base to rest upon, and at the same time insures accuracy of adjustment. A scale is arranged in view of the operator, indicating the point at which the machine is set, and any change in thickness can be effected without stopping or moving from his working position.

The feed rolls are five and a half inches in diameter,



SURFACE PLANING MACHINE OF CONNELL & DENGLER, ROCHESTER, N. Y.

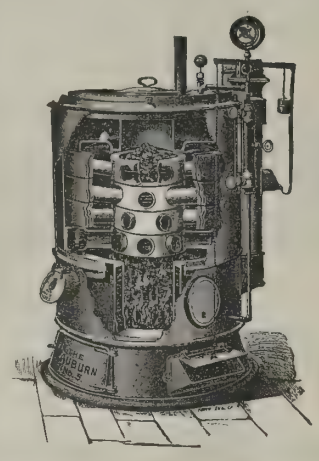
all geared and driven, and planing any desired thickness up to six inches.

The feed pressure is by weight and lever, the weights resting on stops, excepting while a board is feeding through, and the feed works are controlled by a tightener. The cylinder is forged steel, belted at both ends, and has heavy journals running in babbitt lined boxes of great length, insuring solidity and steady motion. The countershaft has twelve-inch tight and loose pulleys, six inches face, and should make 1,000 turns per minute. The weight of the machine is 4,000 pounds.

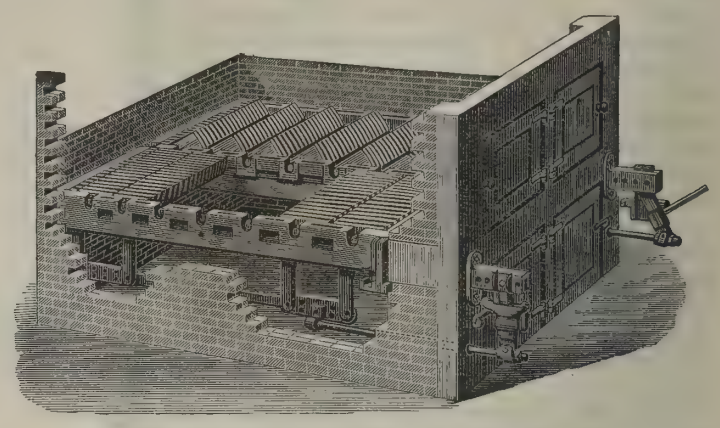
THE "AUBURN" BOILER FOR STEAM HEATING AND THE WOODCOCK PATENT SHAKING GRATE.

A boiler for steam and hot water heating which gives a great amount of effective fire surface, which requires but little attention in operation, and is not liable to get out of order, is shown herewith, and is manufactured by Messrs. Woodcock & Co., of Auburn, N. Y. Above the fire pot is a middle section of simple but novel construction, consisting of inside and outside hollow rings connected by hollow arms, and coming one above another, so that the inner rings form a fuel magazine entirely surrounded by water. The boiler is made entirely of cast iron, and is so constructed and put together as not to be injuriously affected by sudden or severe variations of temperature.

The same firm also manufacture a shaking grate—



"AUBURN" BOILER.



THE WOODCOCK PATENT SHAKING GRATE.

the Woodcock patent—which is made of a number of interlocking segments, as shown in the illustration. Each of these segments has bearings at both ends, and by means of downwardly projecting arms attached to a horizontal shaking bar they may be tripped up at the same angle simultaneously. There is a self-locking arrangement to keep the grates level, preventing their points from being burned. The shaking apparatus can be applied either on the inside or outside of the boiler front, the latter way preventing any dust arising and stopping the necessity of opening the doors in order to shake the fire. The grates keep a uniform distance apart in shaking, and cannot pass each other, except in order to dump the fire, thus preventing coal from dropping through, no matter how inexperienced the fireman may be.

Furnaces provided with these grates afford the largest amount of air space possible, thus giving the greatest draught and the most perfect combustion, supplying the largest percentage of steam with the least consumption of coal. They are adapted to burn coal of any size.

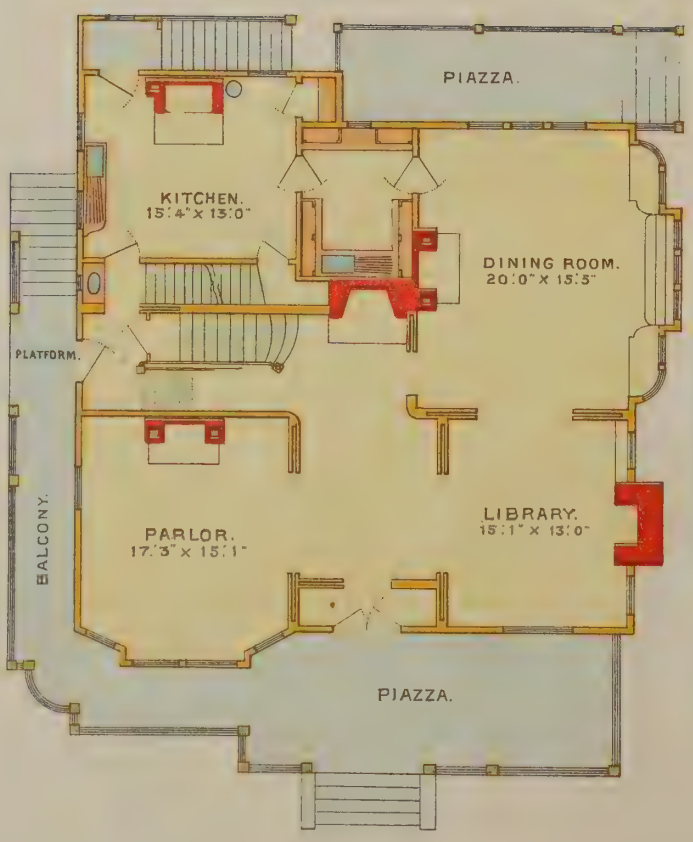
Design in Architecture.

What are the means by which a satisfactory architectural design may be obtained? The best general answer that can be given to this question is, perhaps, that which was given by the painter Opie to a young artist from the country, who, struck with the brilliancy of Opie's coloring, timidly ventured to inquire with what he mixed his colors. To this the gruff old painter briefly replied—*Brains!* In that one word is the whole theory of architecture. If a man will only think of what he is doing, and think of that only, I defy him to produce a bad design. A vulgar man may impress something of his own vulgarity upon it; a weak man something of his feebleness; but if the position of the art is up to the mark of the age, these will not be perceptible to the general eye. An earnest, purpose-like design, pretending to be nothing but what it is—going straight to its object, and giving evidence of careful study and thought—must always be pleasing, not only to its contemporaries, but through all ages, even if neither ornamented nor ornamental, while no extravagance lavished on a falsehood can remain tolerable beyond the fleeting fashion that gave rise to it. To descend a little more to particulars, the principles of design in architecture may be classed under four distinct heads, thus: Convenience in arrangement; economy in construction; ornamental arrangement; ornamental construction. The first two belong, properly speaking, to the builder, or to the engineering part of the profession, and only the last two, strictly speaking, to architecture; but unless he gets them done for him, which sometimes, though rarely, may be an expedient arrangement, no architect must neglect the former two. Indeed, the foundation of all good architecture is that the building shall be so arranged as to meet the purposes for which it is intended in the best possible manner. This alone will not suffice to make a building beautiful, but it will go as far toward it as almost any other quality, and nothing that can be added will redeem the want of it.—*J. Fergusson.*

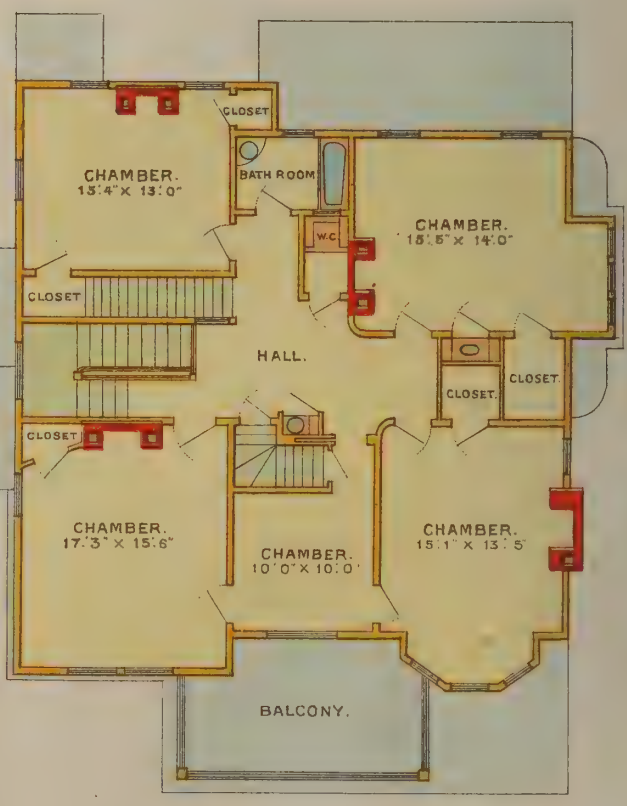
Ebonizing.

One of the English furniture gazettes gives the following account of the French process of ebonizing: One of the most ingenious as well as serviceable methods practiced by French artisans in wood is that by which is produced a complete resemblance in the color, beauty, and density of ebony by the skillful use of charcoal upon the surface. None but carefully selected woods of close and compact grain are employed for this purpose, and these are covered in the first place with a coat of camphor dissolved in water, and almost immediately after with another coat composed chiefly of sulphate of iron and nut gall. The two combinations in blending penetrate the wood and give it an indelible tinge, and at the same time render it impervious to the attacks of insects. On these two coats becoming sufficiently dry, the surface of the wood is rubbed at first with a very hard brush of couch grass and then with charcoal of substances as light and friable as possible, the fact being that if a single hard grain remains in the charcoal it will scratch the surface, which should be perfectly smooth. The flat parts are rubbed with natural stick charcoal, the indented portions and crevices with charcoal powder, and, alternately with the application of charcoal, the article operated upon is rubbed with a flannel soaked in linseed oil and turpentine. These pouncings, repeated several times, cause the charcoal powder and the oil to penetrate the wood, insuring a beautiful color and a perfect polish.

A RESIDENCE OF MODERATE COST.



Plan of First Floor.



Plan of Second Floor.

REAR ELEVATION

BUTLERS' PANTRY

SIDE ELEVATION

CHAMBER

CHAMBER

HALL CLO.

HALL

CHAMBER.

TRUNK ROOM

ATTIC PLAN

VESTIBULE DOOR.

DOOR

SEE NO STORY TRIM

BASE BLOCK

FIRST STORY BASE

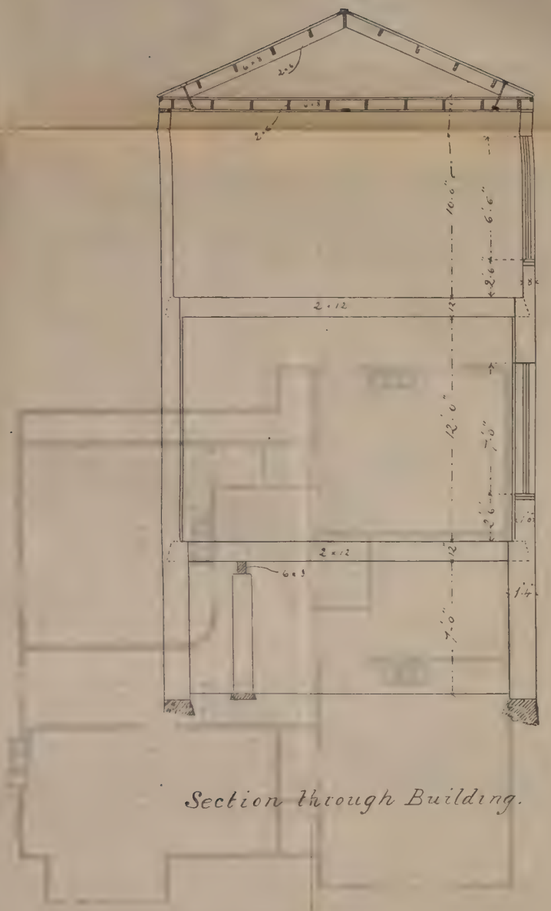
FIRST STORY TRIM

Concrete

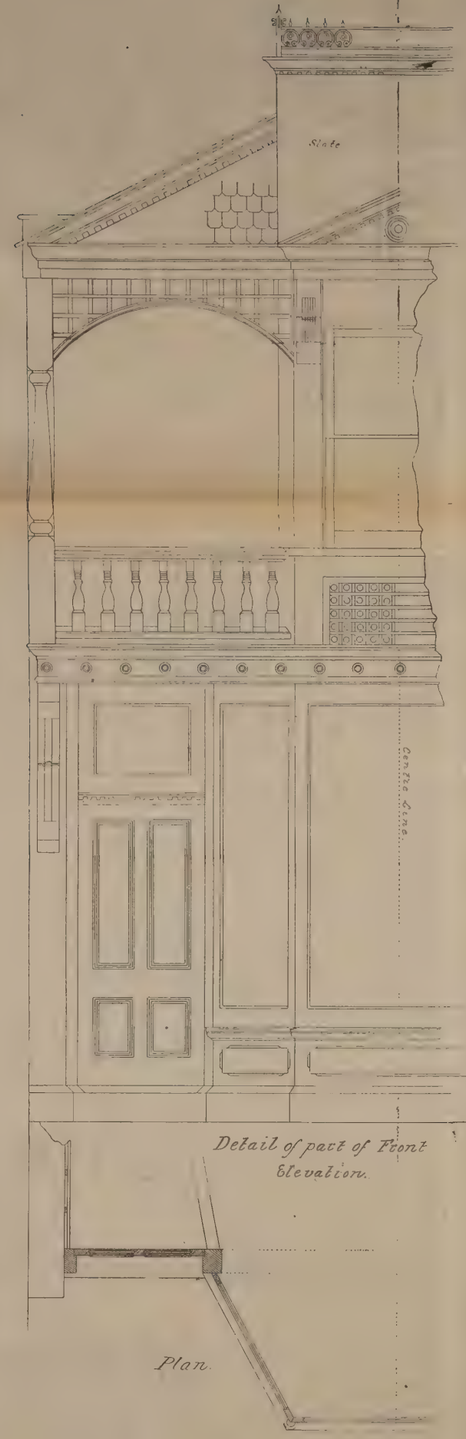
Unglazed Tile

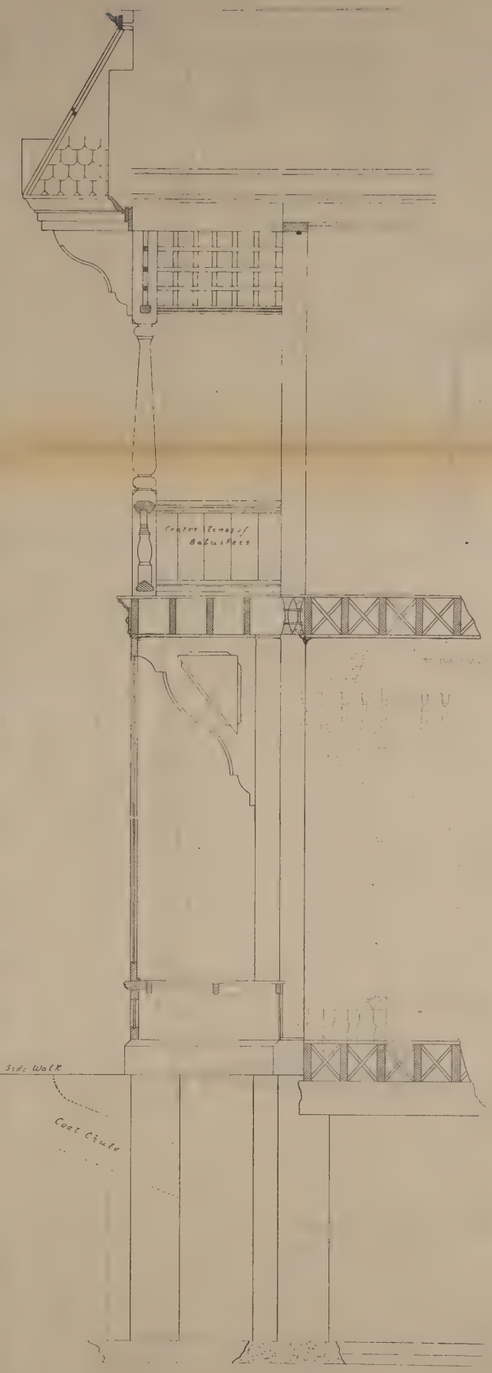
A Residence of Moderate Cost.

Details to accompany Colored Plates. For description see Architects and Builders Edition of Scientific American for October, 1887.



Section through Building.



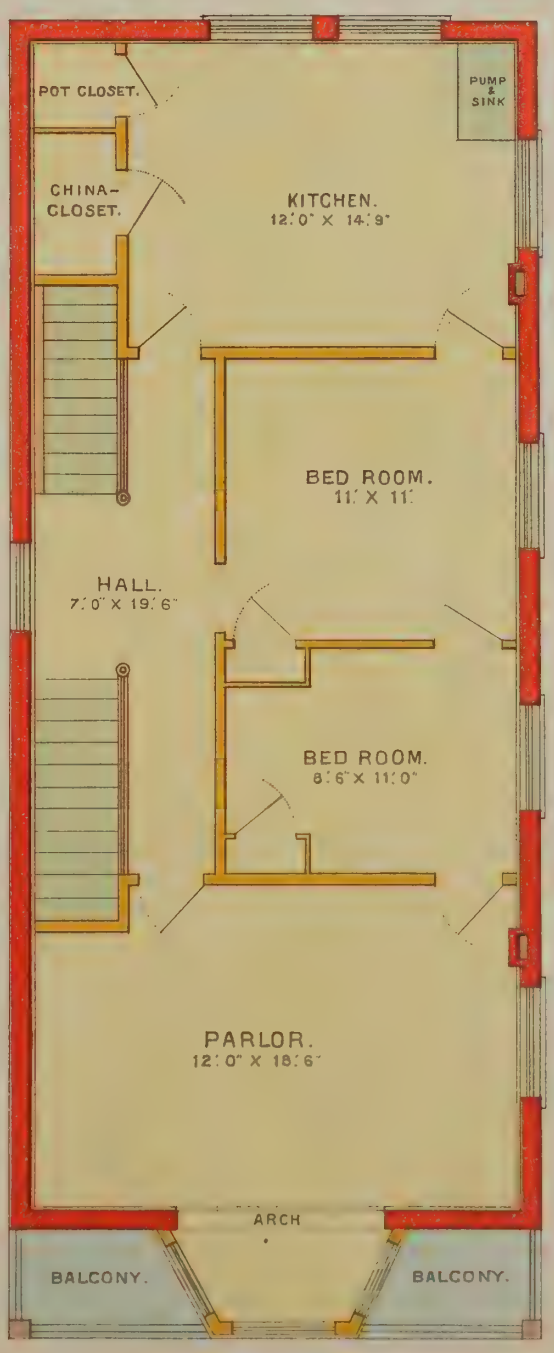


A Country Store.

Details to accompany Colored Plates. For description see Architects and Builders Edition of Scientific American for October, 1887

A COUNTRY STORE AND FLAT.

Plan of First Floor.



Plan of Second Floor.

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HOLBROOK HALL, NEW YORK—LATELY CONDEMNED FOR DRY ROT.

[For description see page 104.]

Scientific American.

ESTABLISHED 1845.

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No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

NEW YORK, NOVEMBER, 1887.

THE

Scientific American,

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Disinfecting Sick Rooms.

Dr. H. Gerould, of Cleveland, O., writes to the New York *Medical Journal* that the following proved to be all he could desire, viz., 3 drachms of potassium nitrate dissolved in 8 ounces of Platt's chlorides, full strength. In this he saturated thin muslin (cheese cloth), then dried it thoroughly. When it was necessary to cleanse or purify the room, he burned small strips of the cloth on a shovel in different parts of the room and under the bed clothing. All offensive odors disappeared. This was repeated, when necessary, the potassium nitrate being used to aid combustion. The result was such that no discomfort was experienced by the attendants, and no offensive odor could be detected in the adjoining rooms. This method of disinfection, the writer adds, would be equally efficient in all contagious, pestilential, or infectious diseases,

CONTENTS

Of the November number of the ARCHITECTS AND BUILDERS EDITION of SCIENTIFIC AMERICAN.

(Illustrated articles are marked with an asterisk.)

CONCERNING AGENTS.

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CITY FRAME HOUSES OF MODERATE COST.

Our colored plate illustration this month is a view of three fame dwellings situated on south side of Jeffer- Ave., near Ralph Ave., Brooklyn, by Chas. E. Hebberd, architect, 62 Broad St., N. Y. The lot is 50 ft. front, and the dimensions of each house 16·8 by 36′ deep. Cellar of stone, basement of brick; 12″ walls front and rear, and 8″ party walls; two stories above, of frame, filled in with brick.

The design of front is a decided innovation over the customary stereotyped city house, and meets a want that we feel our readers will appreciate.

Our experience is that the general public are becoming tired of the monotonous row after row of exactly the same design of city house, and there is a demand for houses of this description, while the ordinary front remains unsold and unoccupied.

The general ground plan is about the same as the average city house, with flat tin roofs and party walls.

In fact, this arrangement has been thoroughly worked over and experimented on, and yet still retained as near perfect as can be devised for one-family houses with the narrow city lot.

The exterior will bear a few explanations. The bay window on both parlor and second story and the large one-light window in basement make all the front rooms decidedly inviting. The judicious use of sawed shingles along the front and at the base of bay serves to relieve the monotony at small cost, and the ornamentation in gables and in panels under bay window gives a decidedly bright, artistic effect.

This ornamentation is all worked from the solid, rather than planted on. Details of much of the ornamentation will be found on the supplement sheet. The frame is sheathed on all sides, filled in with brick laid on edge, covered with building paper, and then clapboarded. Plastering throughout is three coat work. Slate mantels in parlors and dining room, and fireplace heater in basement. The net cost complete, including plumbing, was $2,500 each.

A DWELLING FOR $2,500.

Specifications of materials and labor required in the erection and completion of frame dwelling at Belleville, N. J., according to drawings made for the same by Charles G. Jones, architect, 280 Broadway, New York.

For dimensions, etc., see plans.

MASON WORK.

Excavating and Grading.—Excavate to the depths required for cellar, walls, piers, cistern, cesspool, privy, and drains.

Dispose of the surface earth so as to use it for finishing the grading at completion.

Remove all surplus earth or rubbish to a suitable place of deposit. Do all filling in required around walls, pipes, etc., and thoroughly ram the earth and grade off as directed.

Foundations.—Build up foundation walls of good building stone laid in cement mortar. Plaster the outside of wall from bottom to grade with a heavy coat of cement mortar. The piers for piazza and stoops to be stone, and to go 8″ below cellar bottom.

Build up piers in cellar of hard brick and cement mortar, with stone caps for girders.

Where walls and piers show above ground, the stone work is to be pitched face, and the joints are to be neatly struck and marked. Point up properly where exposed inside. Furnish and set to all cellar windows proper stone sills 4″×8″ neatly dressed.

Build foundation of stone under cellar outside steps, and carry up brick risers on which to set bluestone treads, laid in cement mortar.

Cesspool.—Build a cesspool with dry walls, of large size field stone, at a distance of 50 feet from house, where directed, and dome the top with hard brick and cover with stone flag 2 feet square. Size of cesspool, 6′×6′.

Drains.—Lay from house to cesspool a 5 inch heavy glazed tile drain, joints to be pointed up with cement.

Privy Vault is to be stoned up same as cesspool, and where directed, and to be 4′×6′ and 5 feet deep.

Cistern.—Build a cistern where directed with hard burned brick laid in pure cement mortar. Walls 8″ thick and domed over. Plaster the inside in a workmanlike manner with Portland cement mortar, and clean out and leave intact. Flag over the top 2′ 6″ square.

Chimneys.—Carry up the chimneys, as shown, from foundations, with hard burned brick in good lime mortar. Joints to be well filled and struck smooth inside.

Where exposed, bricks are to be selected and laid in red mortar. Set a bluestone cap on top with flue holes cut full size. To be neatly axed.

Build in the chimneys the necessary pipe rings, etc., and provide the fireplace openings, as shown, lined with Trenton front brick in red mortar.

Set a 4″×10″ bluestone lintel over kitchen fireplace, which will also be entirely faced with Trenton front brick.

Bluestone.—Outside entrance to cellar to have bluestone treads and coping.

Set a rubbed bluestone for kitchen hearth.

Turn trimmer arch of brick under same and under all fireplaces. Furnish chimney caps as above.

Cellar Concrete.—Concrete the cellar bottom with gravel, sand, and Rosendale cement concrete four inches thick, well rammed, and finish the surface with Portland cement.

Tiling.—Tile the hearths of dining room and parlor in mortar of cement and plaster of Paris mixed. To cost, laid, fifty cents per square foot.

Lath and Plaster.—Lath the walls, partitions, ceilings, stair soffits, etc., throughout, except cellar and attic, with sound laths not less than $\frac{5}{16}$″ apart, thoroughly nailed with joints broken every 18 inches.

Plaster throughout to be three coat work. "scratch," "brown," and "hard finish," except closets, which will be two coat. Use clean, sharp sand and good lime mixed thoroughly in proper proportions with long, strong hair.

Hair to be put in after lime is thoroughly slaked, and no mortar to be used until a week after mixing. Plastering to be straight and true, and worked to the grounds.

Run cornices of gauged mortar and white sand in parlor, dining room, and hall of first story, as per detail, and furnish and set centers for same rooms of approved design. Run rule joint moulds on corners of transoms, and provide and set brackets for same. Do all patching required, and clear away all rubbish.

CARPENTER WORK.

Framing and Timber.—Thoroughly frame the building throughout, as required to carry out the plans, with 4″×6″ spruce sill, to rest on stone wall, 4×4 corners posts, plates, frames of doors, windows, etc., and wherever else required for additional stiffness or strength. Studs to be 2×4, 16″ from centers, with sills and plates same size as required.

All parts of framework to be properly braced and bridged as directed, especially at exterior corners. Girders in cellar to be sizes called for on plans. The first and second story floor beams are to be 3″×8″, 16″ from centers. Ceiling of second story to be 2″×8″ beams, 16″ from centers. Floor beams to run from north to south. All to be bridged with 1″×2″ cross bridging, two rows in each span, thoroughly nailed.

Main roof rafters to be 2″×6″, 18″ from centers, footed to plates and well spiked. Ridge poles to be 1½″×8″. Valley rafters to be 3″×10″. Frame for piazza floor with 2″×6″, 16″ from centers.

Roofs of bays, piazza, and extension to be of joists as required. Frame down ceilings for same where necessary.

Sills, posts, plates, floor and roof beams, etc., to be securely framed and spiked together.

Second story floor beams to rest on a 1″×6″ girt let into studs and spiked.

All inside partitions to have cross bridging.

All floor beams used as headers or trimmers to be 4″ thick. Spike the beams well where mortised.

Halve the sills together at corners. Truss over sliding doors and other openings requiring it.

All beams, girders, sills, plates, etc., to be of spruce, and studding of hemlock.

Sheathing.—Sheathe the entire outside of building, walls, and roof with hemlock sheathing boards, millworked one side, 1″ thick, and set tight and well nailed. Cover with two thicknesses of heavy rosin-sized sheathing paper, lapped and secured thoroughly and kept intact.

Outside Covering and Trimmings —Side up the house as shown on elevations and details with clapboards of pine 5½″ wide, laid 4½″ to the weather, except gables, tower sides above cornice, and a band around building—omitting rear—of the width of space between first story cornice mould and sill of second story windows, which will all be shingled as per details. Roofs of the two bays to be shingled in same style as sides of

building, but tower and extension roofs and roof of piazza to have uncut shingles laid 5″ to the weather. Shingling to be curved out at bottom, where shown, as per details. All hips to be furnished with saddle board shingling.

Corner boards, casings, water table, trimmings, etc., to be 1¼″ stuff, and as shown on details. Corner boards 5″ wide.

Door and window sills 2″ thick.

Piazza posts rails, balusters, cornices, gutters, etc., all to be as per details, with rafters 3×4 pine under ceiling, which is to be matched and beaded 1×4½″ pine ceiling boards. These rafters to be planed smooth and to be of pine.

All exterior covering, trimmings, etc., to be clear, dry white pine. Provide gutters in main and rear extension roofs, same as detail shown for piazza roof, and do everything necessary to prepare the roofs for slating and shingling.

The roof of tower to be curved, as shown, and properly framed as required. To have a scuttle from ceiling of room below. Tower to be square. Properly secure a wooden finial on the peak.

Flash as required in all angles where there is shingling and on the tops of small windows of attic. Also over sill course of second story windows.

Piazza floor to be 1″×4½″ tongued and grooved, and mill-worked one side.

Piazza steps 1¼″ white pine, risers 1″, to have cove mould and nosing and 1½″ strings.

Rear stoop risers, treads, strings, and platform of 1″ pine; to have plain rail and uprights. Fill under piazza and stoops with lattice work frame, arranged so as to easily remove; slats to be about ½″×2″ and 2″ apart, strongly nailed together and secure in place. Build a bulkhead over cellar outside steps, with strong batten doors, and fastened with strong hinges, and padlock, etc.

Interior Trimmings, Floors, Doors, etc.—All interior work to be sound, clear, dry white pine, unless otherwise specified.

Flooring throughout, except attic, to be 1″×4½″ tongued and grooved, mill-worked one side, and thoroughly blind-nailed. Put down floor in attic of hemlock boards, well nailed down, 1″ thick and mill-worked one side.

Grounds.—Put on all grounds required for base and plastering, throughout.

Window Frames.—Cellar, attic, and tower windows to have 1¼″ skeleton frames. Remainder of windows, except the small window shown on north elevation, to be box frames, with 1″ casings and pulley stiles, ½″ parting strip, and 1½″×½″ stop beads, for 1½″ sliding sashes.

All sashes are to be 1½″, except those in cellar, attic, and tower, which will be hinged as directed, and 1¼″ thick. The others are to be double sliding sashes to each window, except the small window on north side, which will be hinged. Sashes divided for glass as shown.

Windows of cellar, rear extension, bath room, tower, and attic to be glazed with best single thick American sheet glass. The remaining windows of first story to have best double thick French sheet glass. The remainder in second story to have best double thick American sheet glass. Set in putty and fasten thoroughly with metal points.

All windows of house, except cellar and the two bays, are to be provided with 1¼″ outside blinds, with rolling slats and strong hinges, and to fasten open and shut. Cellar windows to have strong shutters, hung and fastened.

Door jambs are to be 1¼″, stiff rabbeted for doors, and securely put together and set. Blockings to be behind hinges. Provide and hang in windows of the two bays inside blinds 1″ thick, of pine, beaded edges, cut once in the height, three folds to each window, except small side windows of front bay, which will be two fold, to hinge from inner side. All to have revolving slats and rods.

Doors.—All doors, except closet, sliding, and front and vestibule doors, to be 1½″ thick, four panels, with flush mouldings, both sides. Closet doors to be 1¼″, four panel, flush mouldings outside. Front, vestibule, and sliding doors to be 1¾″ thick. Front and vestibule to be special design as shown. Sliding doors to be four panel, flush moulded. Vestibule doors to have upper panels glazed with frosted glass, and also the transom over front doors, one light each.

Trim.—Trim to be 4½″ wide, 1″ thick, mitered, and as per details.

Base to be 1″×8″, with rule joint on top throughout. All trim, doors, etc., in parlor, dining room, and hall to be extra clear dry white pine, for finishing in the natural wood. Closet and pantry trim will be 1″×4″, mitered at top and run to floor unmoulded. Base for closets ¾″×6″. Door saddles throughout to be ash, beveled.

Stairs.—Main stairs to have 3″×3″ ash rails (moulded), and pine 6″ starting newel, and 4″ platform, and second story newels all turned To be 1½″ turned balusters. Treads to be 1¼″, with cove and nosing. Risers 1″, strings, fascias, etc., 1¼″ beaded.

All to be well timbered, framed, housed, glued, and secured.

Attic stairs to have strings, risers, treads, etc., of 1″ and a moulded pine rail up to platform.

To be inclosed above platform with ceiling boards 4½″ wide.

Frame cellar stairs of 2″ stuff, to have strings and treads. Treads dressed one side. Construct in the first story hall as shown the feature at front of main stairs. Do any woodwork around sink that may be necessary to secure it, and carry up beaded strips 2′ 6″ higher than sink, and wainscot the entire space between the doors either side of sink to same height. Provide a drain board for sink.

Run a chair rail same section as trim around the kitchen, at height where shown.

All closets are to be fitted up as directed with dry pine shelving, and closets of second story are each to have a row of double clothes hooks on cleats, entirely around closets. Hooks to have flat heads and to be black japanned.

Hardware.—First story front outside doors to have 5″ mortise lock, with night latch, brass face plates, keys, etc. Knobs, drop, roses, bell pull, etc., to be of bronzed iron. Fasten on inside with top and bottom bolts, all complete. To be properly hung with 5″ loose pin butts of bronzed iron, ornamental face.

First story doors to have 3½″ black japanned butts, plain with acorns, and 4½″ mortise locks, with brass face plates and keys. Knobs and drops white porcelain, except sliding doors, which will have proper sliding door lock, with pulls, etc., brass face, all complete. To be run on brass track and to have best anti-friction sheaves.

Remainder of doors throughout, including closets, etc., to have 3″×5″ rim locks, with white porcelain knobs and drops, and brass keys.

Cellar, attic, and tower windows are to have strong hinges and buttons. All double hung sashes to have cast iron weights, best noiseless pulleys and best hemp cord, and proper sash fastenings, as selected.

Inside blinds to have brass butts, shutter bars, and knobs, complete. Outside blinds and shutters to have strong hinges and catches to fasten open and shut. Hearth borders for parlor and dining room to be ash, well nailed down.

Fit up a 4″ gong in kitchen, to ring from front door, with pull, wires, etc., complete.

Mantels will be furnished by other parties.

Wainscot the bath room with matched and beaded strips 3″ wide, ⅝″ thick, tongued and grooved, with suitable cap. Case around bath tub, wash basin, and water closet, and do all fitting up required to make these fixtures complete. To be arranged so water closet front can come apart readily, and to be door under wash basin.

Fit up a coal bin in cellar, with strong plank and studs, with door opening and sliding boards that can be removed at will.

Set four turned chestnut clothes posts with cross pins in yard, where directed.

All exterior plaster angles to have 1¼″ turned angle beads. Do all necessary cutting and fitting for and make good again after other workmen.

Provide two scuttles for roof, with hooks, etc.

Ceil up under the main stairs so as to close off the main hall from the cellar stairs, and case the outer partition where it shows on cellar stairs. Fill in pieces between the studs at first and second story floors so as to cut each story completely off from the one below. Set a 3″ roll on roof ridges for attaching metal.

Build an outside privy house, 4′×6′, with strong frame of studs, with sills, plates, and rafters, and sheathe and clapboard the outside, using sheathing paper. To have corner boards and water table, and roof to be shingled on sheathing boards and paper. To have batten door with fastening latch, and seat to be arranged with two large holes and one small, on different levels. Seats to be of 1¼″ stuff. Provide two sliding sashes.

Slating, Tinning, Flashing, Leaders, etc.—All roofing to be done over best rosin-sized sheathing paper as before specified. Cover the main roofs with best selected dark blue Pennsylvania slates, 10″×20″ and 8″ to the weather; slates to be of good, even thickness, straight, and thoroughly nailed with galvanized nails.

Provide and work in the necessary flashings on chimneys, valleys, angles, etc., for all roofs, of zinc. Tin all the gutters with heavy tin in small sheets, properly lapping and protecting, and running the tin well up under the slating and shingling Paint the tin work two coats of paint both sides. Tin two scuttles and flash around them. Provide and set heavy ridge cappings of zinc, with 6″ lap on slates.

Form a gutter and do all trimming and flashing around tower that may be required, including finial. Flash over the tops of attic windows and along over the course running level with second story window sills with tin, also the short cornice returns in gables.

Provide, set, and connect leaders from piazza, rear extensions, and main roofs. Those for piazza and extension, to be 2″ round. The remainder 3″ round, to be as may be required to properly connect the gutters. All to be thoroughly secured and connected and of galvanized iron, with galvanized basket protectors at leader heads. Where leaders connect with cast iron pipe, put in a valve that can be operated to turn the water into the cistern or not, as may be desired.

PLUMBING.

Drain Pipes.—From the tiled rain in yard carry into house a 4″ cast iron drain to receive waste from fixtures, and to be carried up above roof and capped. Leave Y branches at first and second floors and another 3′ above fixtures in second floor for receiving back air pipes. This drain pipe is to be trapped at base before leaving the house with movable cap for cleaning purposes.

Drain to be well tarred, and to be secured with hooks and rests as required. Joints to be thoroughly calked with oakum and molten lead. Connect lead and iron pipes with brass ferrules, joints well calked, soldered, and "wiped."

Pump.—Furnish and set in kitchen a Champion No. 1 horizontal double acting suction and force pump, with copper chamber.

Connect with pump and carry to bottom of cistern a 1¼″ heavy lead suction pipe, pierced with holes at end, to have air cock.

Supply Lines.—Carry from pump to bottom of tank a 1″ galvanized iron pipe, with stop and waste to run into kitchen sink, so as to empty the lines above, and to supply the sink direct from pump when desired. Supply lines to fixtures, to be ⅝″ galvanized iron pipe. Grade the pipes so as to drain out.

Tank.—Furnish and set in attic a strong tank 4′ × 4′ × 4′, and line with 16 oz. tinned and planished copper, with proper inlet and outlet connections.

Connect overflow of 1¼″ lead waste and run to kitchen sink.

Boiler.—Furnish and set in kitchen a 30 gal. iron boiler on iron stand, supply through ⅝″ galvanized iron pipe, with stop and waste cock, and provide sediment cock for emptying boiler.

Fixtures.—Fit up in kitchen a cast iron sink 1′ 4″ × 2′ 4″, with strainer. Supply with hot and cold water through brass flange and thimble cocks, with hose nozzle on cold water cock. Cocks to size of supply pipes.

Waste sink through 1½″ lead waste pipe and strap with screw.

Water Closet.—In second story bath room fit up an Ideal washout closet, with square bowl and hand opening for cleaning purposes. Waste water closet through 4″ heavy lead waste and strap with screw into cast iron drain.

Furnish and set a copper-lined cistern for water closet with automatic valves, ball cock, after wash, etc., complete, suitable size, and make the necessary connections for flushing water closet through 1¼″ D lead pipe, and for supplying cistern from upper tank.

Discharge an overflow pipe from water to the bowl of the water closet.

Bath Tub.—Furnish and fit up in bath tub of 16 oz. tinned and planished copper ... length, with overflow and nickel plated combination cock, plug, chain, strainers, etc. Waste through 1½″ lead pipe and S trap with screw.

Wash Basin.—Furnish and set in bath room a patent marbleized 12″ wash basin, with overflow, and fastened with brass clamps to a countersunk Italian marble slab, with base.

Supply basin with hot and cold water through nickel plated swivel basin cocks. Waste through 1¼″ lead pipe and S trap, with screw and nickel plated plug, chain stay, and strainer.

Back Air.—Connect all traps with 1½″ lead pipe, and carry to a point on the soil pipe 3′ above the highest fixtures.

C. I. Leader.—From a point 3′ 6″ above ground carry to cistern a 4″ cast iron drain pipe, which is to receive the rain water leaders, and is to be calked with oakum, and joints filled with molten lead well hammered in.

Safes.—Under water closet, bath tub, and wash basin provide lead safes, with edges turned up and drained through ¾″ lead pipe to cellar.

Range.—Furnish and set in kitchen a Beebe range, and make connections with boiler through ¾″ lead pipe.

Heating.—Furnish and set complete a portable furnace, size, make, etc., as will be directed. Carry from furnace to registers, with pipes of indicated sizes and where shown on plans, set in partitions having valves near furnace and with register boxes and black japanned registers, with valves, etc., complete, the sizes called for. Set in plaster of Paris. Connect properly with smoke flue, and leave everything complete.

Cover over the pipes in partitions with metal, lath both sides, and thoroughly secure and leave ready for plastering.

PAINTING, VARNISHING, ETC.

All exterior wood work and metal work is to be given two coats of best linseed oil and white lead paint, colors, etc., as may be directed. All wood work of parlor, dining room, and hall to receive two good coats of oil and two of spar varnish. The remainder of interior wood work is to be painted two good coats

of best linseed oil and lead paint. Putty everything up thoroughly and sandpaper and rub down as required

First coat to be put on the outside as soon as possible after the wood work is up.

IN GENERAL.

All work and materals to be the best of their several kinds.

The drawings and specifications are supplementary to each other. Anything shown in one and not in the other must be done as though fully drawn and specified.

The contractor is to supply all labor and materials necessary to properly complete his branch of the work, unless otherwise herein specially excepted, and is responsible for and must deliver up his work perfect at completion.

He is to remove all rubbish caused in carrying out his work.

The following is our estimate for the above house:

Framing, raising, and sheathing	$580.00
Clapboarding, belts, cornices, etc	490.00
Lining gutters, slating, leaders, and flashing	190.00
Piazza, back stoop, cellar door, and lattice	240.00
Plumbing	345.00
Flooring and partitions	145.00
Stairs	130.00
Sash, doors, and blinds	355.00
Trimming	260.00
Hardware	96.00
Total	$2,531.00

MICKENS & BYRAM,
Carpenters and Building Contractors,
Newark, N. J.

A LARGE BUILDING ENDANGERED BY DRY ROT.

The large and splendid apartment house known as Holbrook Hall, located at the corner of Fourth Avenue and Sixty-second Street, New York, was lately discovered to be in an unsafe condition, owing to the presence of dry rot in its wooden joists. We give an engraving of the structure, which was erected about four years ago, in first class style, at great expense. It is eight stories high and one hundred feet square.

With a view to protection against fire the joists were covered and inclosed with cement—a fatal mistake. It is well known that wood when thus inclosed, and access of air prevented, will decay, and the rot will more rapidly progress if the wood be green or unseasoned. Such is believed to have been the case in this instance. The joists were of hemlock.

The early discovery of the dry rot in the timbers was due to a slight fire which broke out on the upper story of the building, which burned the floor and exposed the timbers to view. It is believed that the entire building will have to be taken down. It was considered to be in danger of falling at any moment when the discovery was made, and all the families in occupation were at once obliged to vacate. The order to leave was given in the evening, and the tenants took refuge in neighboring hotels.

The Trade Unions.

In Middletown, N. Y., a Mr. Smart undertook to build a factory, and hired bricklayers and masons. A part of the work consisted in the construction of melting furnaces for glass, and Mr. Smart, being thoroughly familiar with the proper mode of laying the firebrick around such furnaces, and wishing to have this important part of the masonry done in the particular manner that he preferred, took up a trowel and began to lay a few bricks. Immediately an uproar arose among the masons and bricklayers, who informed their employer that they would not work with a "scab," meaning himself, and threatened to strike in a body unless he laid down his trowel at once.

In another case, a walking delegate of the Carpenters' and Joiners' Union was brought into court in New York, charged with having deprived Robert Hoff, a journeyman, of work. It had appeared that Hoff had belonged to the union, but had for some reason incurred a fine, which he refused to pay. He was thereupon expelled from the union, and the walking delegates were set upon his track to persecute him. He was at work in a large shop in Twenty-eighth Street, where the delegate found him, and his employer was notified to discharge him, under pain of having all the rest of his men called out if he refused. He resisted for some days, but was at last compelled to ask Hoff to give up his work until the matter could be adjusted, and Hoff thereupon entered a complaint against the delegate. The case was called before Judge Gorman, who explained the law of New York to be that a walking delegate had no right to go to an employer and threaten to deprive him of his men unless he would discharge a particular workman, although the delegate had, as he said, "a perfect right to go among the men belonging to his union, and arrange with them to stop work."

PUTTING WATER HEATING PIPES IN COOK STOVES.

Most first-class cook stoves are so arranged as to admit of a water back or water front, which in most cases is made of cast iron, and hollow. Two pieces of water pipe are screwed into the back, one over the other, so when the cold water goes into the back through the lower pipe and becomes heated, it will go out through the upper pipe. Many of the cheaper stoves are not provided with water backs, nor are there any holes in them for the inlet or outlet pipes; so when such a stove is to be fitted for heating water, the holes have to be made, and gas or water pipes put in to heat the water, unless a cast iron water back made for some other stove can be used, which is seldom the case.

To make the holes in the stove for the pipes, mark the size of the pipe on the stove, in the proper location, then drill holes around the inside of the circle, so the piece can be knocked out without danger of breaking the casting. The hole can be made round by filing out with a half-round file of proper size.

Fig. 1 shows the general shape of a heating pipe for

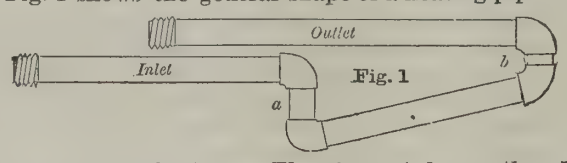


Fig. 1

an ordinary cook stove. The piece *a* is longer than *b*, so that the water, as it becomes warm, will be rising.

The outlet pipe should always be on a slight incline, as it is more natural for hot water to go up than down. Crooks in the pipes should be avoided, as they form air or steam traps, which prevent the water from flowing.

The water pipes should be so located as not to interfere with the oven door, or be in the way of the articles that are to be set in the stove holes.

Fig. 2 illustrates the manner that the pipes should

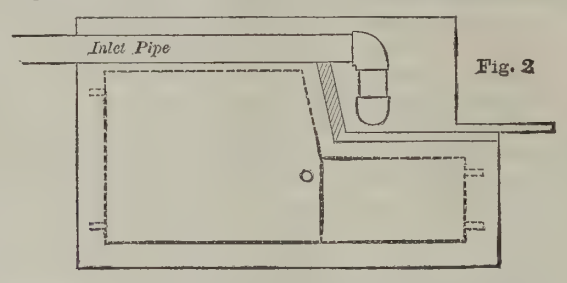


Fig. 2

be located in reference to the door and top of the stove. The pipe in this drawing is too large in proportion to the fire box. In most cases the two elbows at *b*, Fig. 1, should not be more than an inch apart.

Some stoves are made so there is not room for the pipe to go inside the stove to reach the fire back; then it must be put outside and above the oven door, B, Fig. 3. When there is room, it can go as shown by A.

Three-quarter inch gas pipe is usually large enough; put once through the stove. When much water is to

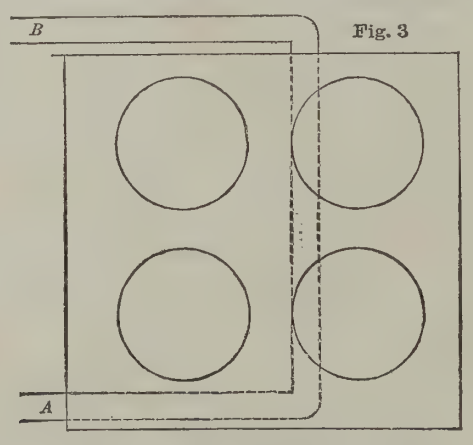


Fig. 3

be heated, it may be necessary to make a "return." If the back of the stove, or rather one side of the stove, sets against the wall, so the oven door is not used, the inlet and outlet pipes can be on that side or back. Most stoves are so located that their position will indicate the location of the pipes.

The main point to be observed in putting in such work is, have the pipes so arranged that the water will, from the time it leaves the coupling under the water tank, be going up an incline, and never under any circumstances try to make hot water go down hill until after it has become heated. As the cold water is supposed to be becoming warmer all of the time, it should have an upward tendency.—*Amer. Artisan.*

Cedar Shingles.

In view of the rather short stock of pine shingles in the Northwest, it appears a little singular that there is not a better demand and a better price realized for cedar shingles. These shingles have been in market a long time, but it is to be confessed that they make but slow progress. They do not sell as readily as pine, and they do not bring quite the same price, yet they are better shingles beyond a doubt. Men of experience in the business are puzzled that these superior articles to be had at a lower price do not take the place of more pine shingles that, costing more, do not answer the purpose so well, and are not nearly so durable. It is possible that the fact that cedar shingles are cheaper than pine may have something to do with their comparatively smaller sale. With a good many consumers the only guide to value is the price, and they would be very likely to infer from the fact of the uniform difference in the cost that there is a corresponding difference in the actual value. And probably another reason why cedar shingles are not more popular is that in many districts they are practically unknown. It is conceded that the white cedar of the North produces a shingle that cannot be surpassed, even by the Southern cypress. As a roofing material it is infinitely superior to pine, and where its merit is once appreciated, there is very little sale for the latter. It is only a matter of making consumers acquainted with a knowledge of its good qualities and its perfect fitness for the purpose to greatly increase the demand and materially improve the price.—*Timberman.*

Some Data on Steam Heating.

The following data on steam heating, taken from my note books, cover some points which were arrived at in the course of professional practice, and which have stood the test of years of special experience.

When the direct system is used to heat buildings such as abound in our great cities—buildings in which the street floor is a store and the upper floors are devoted to sales and stock rooms and to light manufacturing, and in which the fronts are of stone or iron, and the sides and the rear of building of brick—a safe rule to follow is to supply one square foot of boiler heating surface for each seven hundred cubic feet, and one square foot of radiating surface for each one hundred cubic feet of contents of building.

For heating mills, shops, and factories, one square foot of boiler heating surface should be supplied for each four hundred and seventy-five cubic feet of contents of building, and the same allowance should also be made for heating exposed wooden dwellings. For heating foundries and wooden shops, one square foot of boiler heating surface should be provided for each four hundred cubic feet of contents, and for structures in which glass enters very largely in the construction—such as conservatories, exhibition buildings, and the like—one square foot of boiler heating surface should be provided for each two hundred and seventy-five cubic feet of contents of building.

When the indirect system is employed, the radiator surface and the boiler capacity to be provided will each have to be, on an average, about twenty five per cent. more than where direct radiation is used. This percentage of twenty-five also marks approximately the increased fuel consumption in the indirect system. When the overhead system of steam heating is employed, in which system direct radiating pipes, usually one and one-quarter inches in diameter, are placed in rows overhead, suspended upon horizontal racks, the pipes running horizontally and side by side around the whole interior of the building, from two to three feet from the walls and from two to four feet from the ceiling, the amount of one and one-quarter inch pipe required, according to Mr. C. J. H. Woodbury, for heating mills (for which use this system is deservedly much in vogue) is about one foot in length for every ninety cubic feet of space. Of course, as Mr. Woodbury points out, a great range of difference exists, due to the special character of the operating machinery in the mill, "both in respect to the amount of air circulated by the machinery and also the aid to warming the room by the friction of the journals."

Prof. Charles A. Smith gives the following data for the relation between radiating surface and cubic contents as representing the results of the practice of the Dubuque Steam Supply Company, Dubuque, Iowa. He says: "We find that with the external air ranging to 0 degree Fahrenheit, one square foot of heating surface warms a number of cubic feet, as follows, in columns two and three:"

Class of Building.	When heaters are in same rooms (direct system), cubic feet per square foot.	When heaters are in basements (indirect system), cubic feet per square foot.
Dwellings	50	40
Stores, wholesale	125	100
Stores, retail	100	80
Banks	...	...
Offices	70	60
Drug stores	...	...
Dry goods	80	70
Large hotels	125	100
Churches	200	150

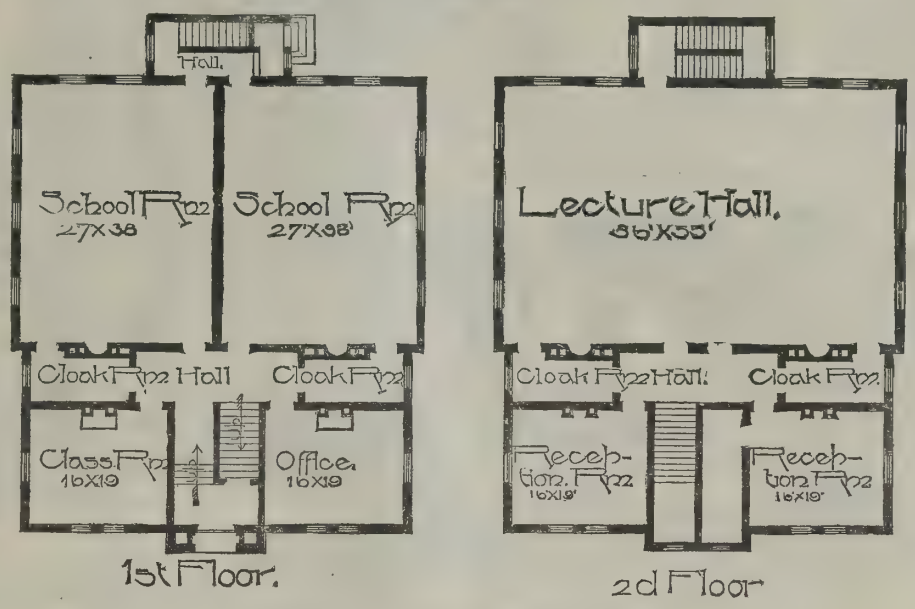
For determining the cross sectional area of pipes (in square inches) for steam mains and returns, it will be ample to allow a constant of 0·375 of a square inch, plus, for each one hundred square feet of heating surface in coils and radiators, 0·375 of a square inch when exhaust steam is used, 0·19 of a square inch when live steam is used, and 0·09 of a square inch for the return. If the cross sectional areas thus obtained are each multiplied by one and three-elevenths, and the square root extracted from each product, the respective figures obtained will represent the proper diameters, in inches, of the several steam pipes referred to.—*A. R. Wolff, in Stevens Indicator.*

SCHOOL HOUSE ARCHITECTURE.

LOUIS H. GIBSON.

The problem of building a school house in a Western settlement which is new, where money is scarce, is a different thing from building a house for school purposes in a State like Massachusetts or New York or other Eastern States. They both want school rooms, they want light and air and a certain convenience. These things belong to both of them in common. The Western school house must be built with a small sum of money. In the first settlements it is a temporary affair. It is not a very comfortable place to be in winter, and altogether has a barren, unsatisfactory look. Yet it is a school house, and serves its purpose. In the course of years that community becomes more wealthy. They get a little money together At the same time that there is more money there is a greater number of scholars to be taken care of. In some instances the development in this respect is in excess of the money supply, in which case the quality of the school house architecture suffers. If we take a locality like Indiana or Illinois, we have a medium condition. They are populous sections, and the wealth is increasing. We are in a condition to build a good deal better house than we did a while ago, and we have to build a great many of them, however, because of the rapid increase of population. But while we are in a position to get all the comforts which may belong to a school room, we can have none of the luxuries. The building must be plain and substantial, it must be well ventilated, and due care must be taken for the comfort of those who constantly occupy it. But on the outside, there is no opportunity for any large expenditures of money. Still, it does not do to have a building offensive to good taste. It is to be noticed that in the buildings throughout this section there is a certain amount of barrenness in their appearance. They look large and in some instances a little clumsy. This is the result of necessary economy, not that good taste and large sums of money naturally go together, but in the effort to save money, which must always be uppermost in the thoughts of those who build school houses, the economy sometimes descends to parsimony, and taste suffers. A good-looking house of any kind is not so much a matter of money as it is a matter of wit. One can put ever so much money in a school building and still have it clumsy and awkward and positively ugly, or he can put in a small amount and properly dispose of the material at hand, using intelligent thoughtfulness in the matter, and a good-looking building may be devised. It takes more thought and more ingenuity to get a building that is presentable for a small sum of money than it does for a larger sum.

In the plans which we are about to give, the idea of utility at a low cost will control everything that is done. At the same time, we will endeavor to give a building which will look well and be generally satisfactory to those who come in contact with it.



SCHOOL HOUSE ARCHITECTURE.

The house which is here given is one which is located in a country town, and for which reason it is somewhat different than what it would be if in a larger city. The audience room on the second floor is something which does not belong to the school houses which are built in cities, where audience rooms, lecture halls, etc., are afforded in other buildings. It would be entirely possible to have the second story arrangement of this building exactly the same as that of the first, in which case it would be a four-room house with the attached recitation rooms.

The rear projection affords an exit to the rear from the audience room, and might not be thought necessary in case of the use of the upper part of the building as school rooms. Altogether, it is questionable whether it is necessary in this instance. However, this was the way the house was built, and as indicating a practical fact it is given in that way. The stairway which would be regularly used would be the one in front.

The cost of this house would be between $8,000 and $9,000. The contract has been awarded on that basis.

In the matter of the cost of school houses or buildings of any kind, it may be said that it will vary in different parts of the same State or the same county. The cost of material and labor has a good deal to do with it, and then the matter of business management controls it very largely. One man or one set of men may be able to build a house cheaper than another because they give it more attention, or more intelligent attention. And while the estimates that are given by this journal for the plans which it will present are correct, we do not pretend to say that everybody will be able to build a house at the cost that we give.

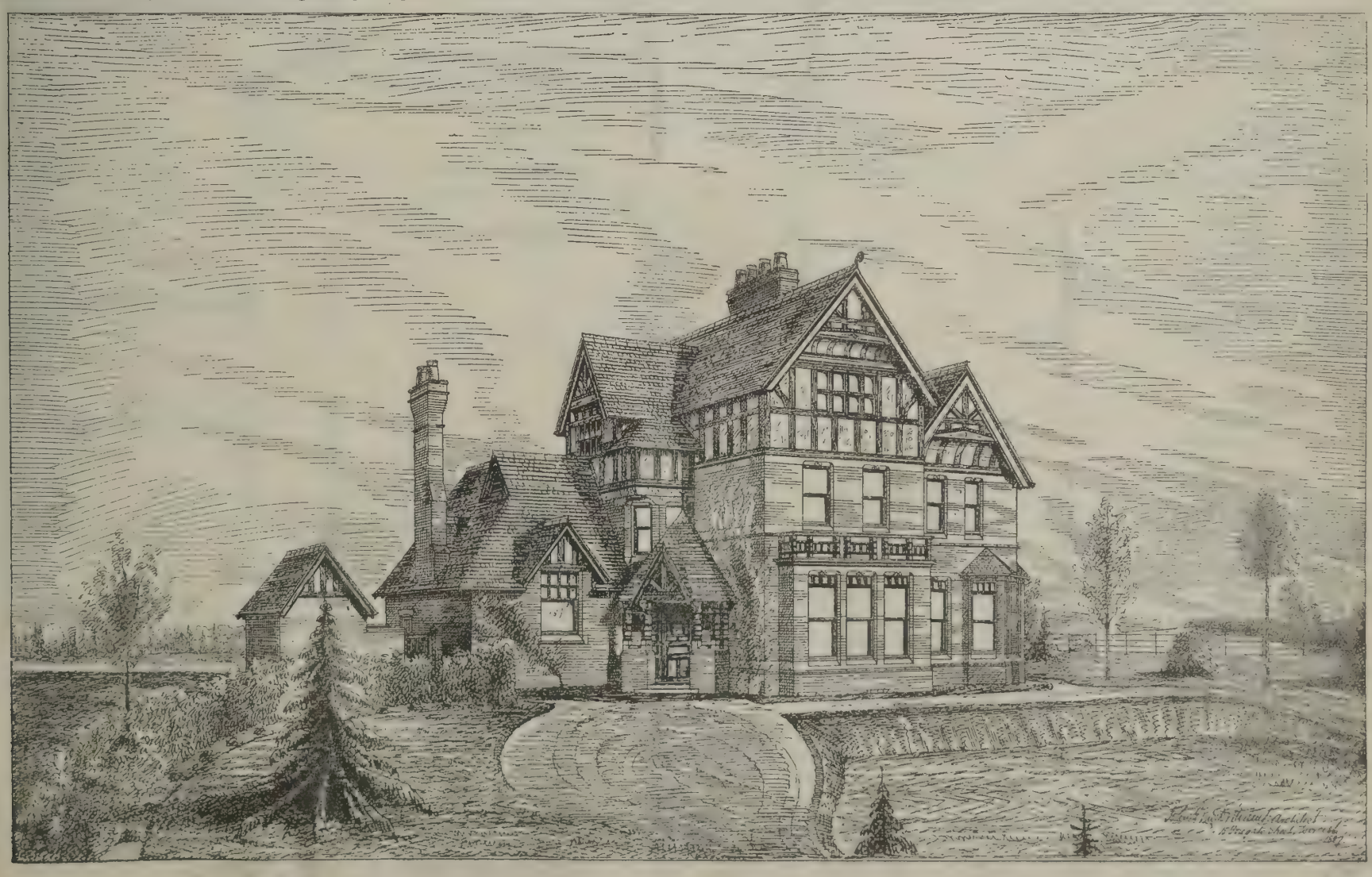
It may not be necessary to say that this building is of brick, as the drawings will indicate that. It has the slate roof, with galvanized iron copings and a tin deck on the top. The finish on the inside is of hard wood. The floors are deadened. The foundation is of stone. It is thoroughly well built.—*Trustees' Trade Journal.*

A RESIDENCE, BATTENHALL PARK, WORCESTER, ENGLAND.

This house has recently been erected for Mr. James Hayes on a large piece of elevated ground forming a portion of the Battenhall Park estate, which lies to the southeast of the city of Worcester, and forms one of the best positions in the vicinity for the erection of first-class private residences, being very high and dry, and commanding splendid views of the Malvern Hills and surrounding country.

The house contains spacious entrance and staircase halls, with the usual reception rooms approached therefrom, with kitchens and offices on the north side. On the upper floors are five bed rooms, bath room, water closet, and housemaid's closet, with a good supply of storage accommodation, the principal stair case, of pitch pine, two stories high, being a centra feature.

The building is of red brick, with Bath stone strings, heads, sills, and ashlar bands to relieve the same, the gables being finished in "half-timber work" and rough cast, and the roofs covered with Broseley tiling.—*The Architect.*



A RESIDENCE AT BATTENHALL PARK, WORCESTER, ENGLAND—JOHN HENRY WILLIAMS, ARCHITECT.

A DWELLING FOR $4,500.

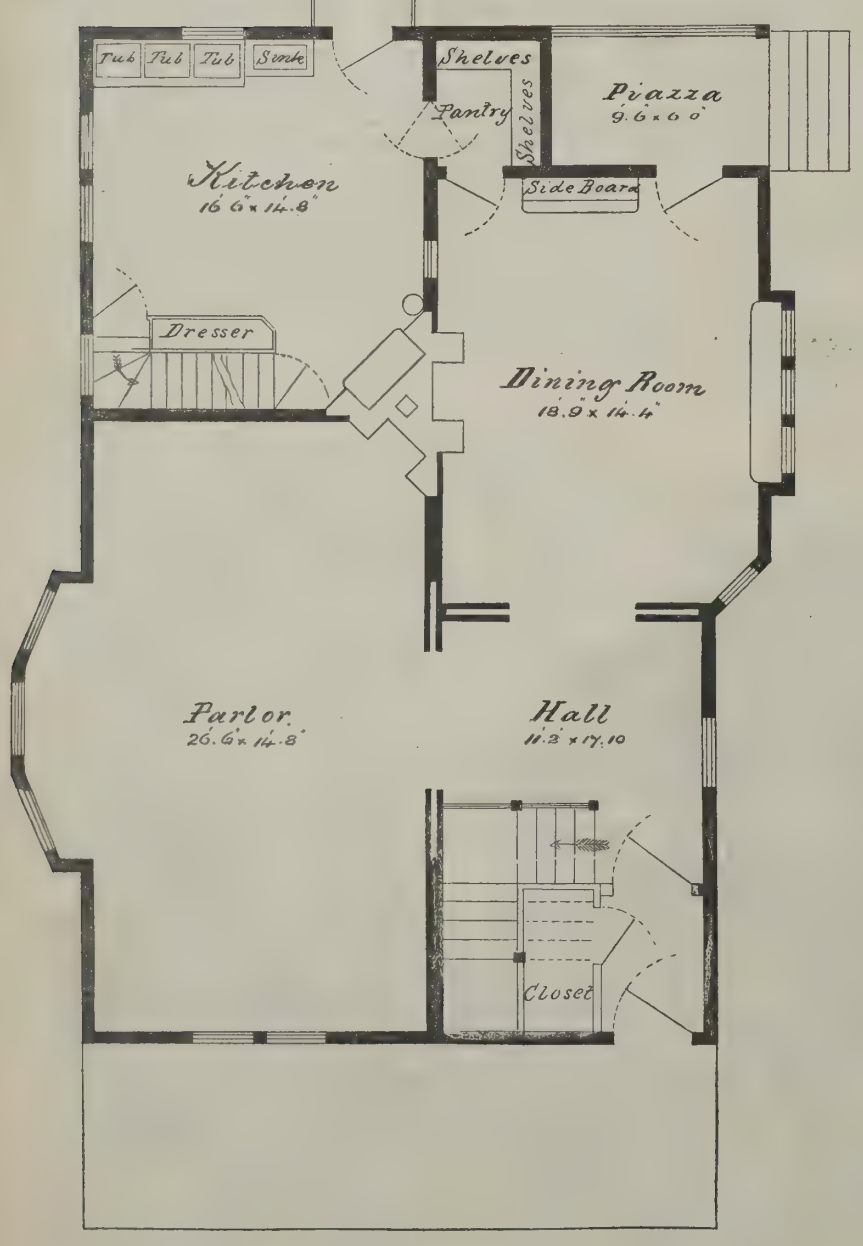
Size.—Front, 30 feet, exclusive of bay windows; side, 44 feet, exclusive of piazza; for size of rooms, see floor plans.

Materials.—Foundation, 12 inch brick wall; first and second stories clapboarded up to the top of the second story windows; shingles from the second story windows up to the roof.

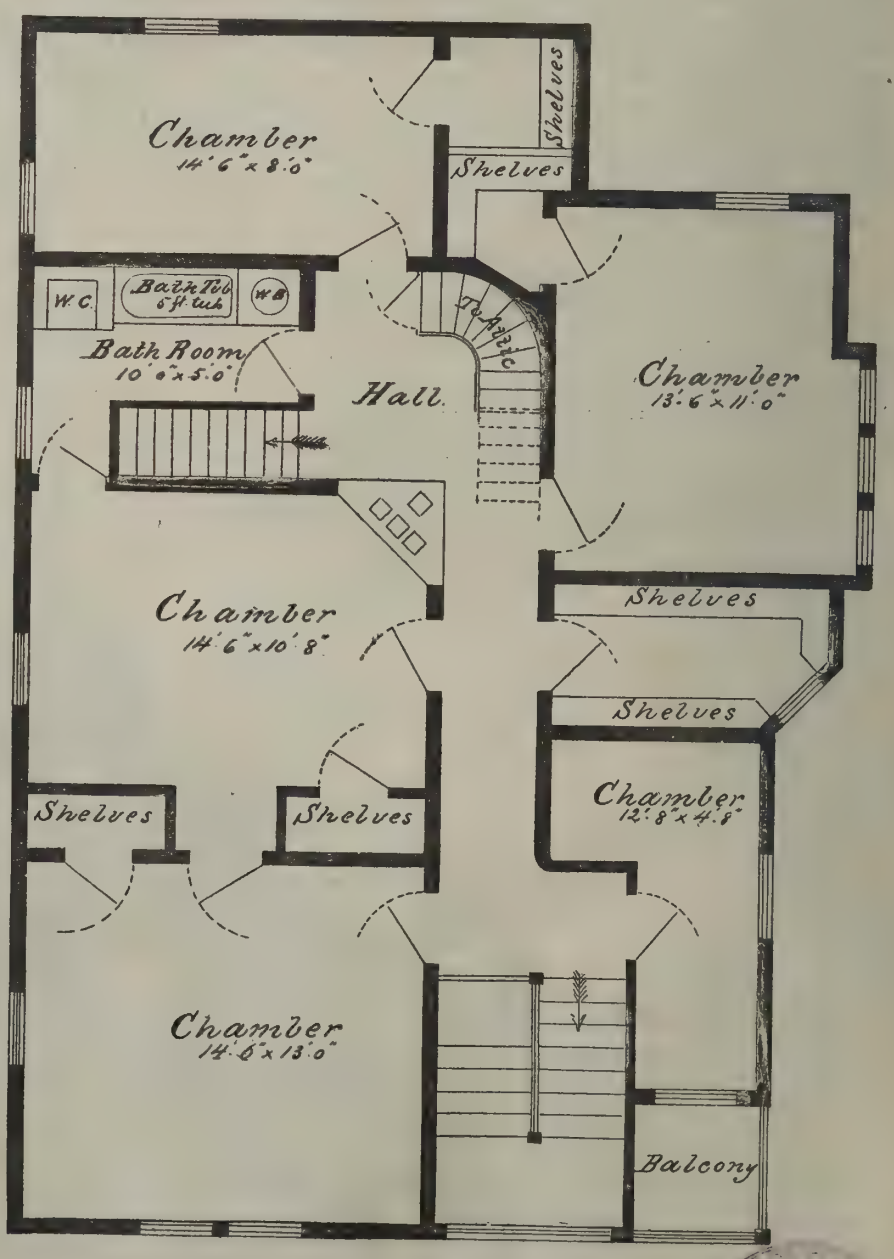
Height of Stories.—Cellar, 7 feet; first story, 10 feet; second story, 9 feet; attic story, 8 feet.

Cost.—$4,500, complete, with plumbing; furnace, etc.

Special Features.—Sliding doors connect parlor, hall, and dining room; attic entirely floored over, and three rooms can be finished therein. Cellar under the whole house, with cemented bottom.



First Story Plan.



Second Story Plan.

A DWELLING FOR $4,500.

AN ORNAMENTAL PAVILION.

At the recent Federal Shooting Festival, Geneva, Switzerland, several ornamental platforms of temporary character were erected for the accommodation of committees and guests. From these we select the drawings of the reception pavilion, as given in *La Construction Moderne*. The architect was M. Juvet. It is a graceful structure and not expensive. Architects and builders may derive useful suggestions therefrom, if called upon to erect anything of this kind for fair grounds.

Plastering.

Persistent efforts are being made in nearly every branch of building toward better and more durable work, and the percentage of better work is increasing accordingly.

About the only part of a building that seems given up as hopeless is the plastering, yet the importance of plastering is rated in the mind of the architect and builder very much lower than the facts justify. Plastering may be described as the substance which bounds three-fourths of the space of our rooms. A successful job of plastering furnishes a better material for finishing rooms from a sanitary standpoint than anything short of metal or glass. It can be applied without joints and at a far less cost than any other substance at all fit for the purpose.

Good plaster is in fact a good artificial thin stone wall without joints and as cheap as the paint on woodwork. It can be modeled and colored cheaply. These qualities have made it a necessity, yet it is a fact that architects insist less upon care in the selection of its materials, and skill in their application, than upon any other finish in the building. Let us look a little into the causes of failure. Of the many materials in use, sand and quicklime are most important. A pretty pure lime is generally used in preference to a lime containing much clay or magnesia. Good quick or fat limes are not hard to get in these parts, and because of their bulk and fineness when slaked they are much cheaper than other sorts.

The sand, it is believed, must be angular and clean, both of which notions are certainly borne out by practical tests. The sharpness of sand may be judged by the aid of a lens after a little experience. Not so its cleanness. Probably a very clean sand of good form will always do its part toward furnishing good mortar, but what constitutes a clean sand is somewhat hard to say. That which is loamy would be rejected by any good builder without question but there is pit sand, plenty of it, that would be chanced in plastering mortar without question, and from which good mortar is never obtained.

The sand is free from loam and clay apparently, and yet some natural process of percolation perhaps has coated the grains of sand so that a good mortar is never obtained. In Minneapolis we are so accustomed to indifferent mortar from our pit sand, that we take poor mortar as a matter of course, unless surprised some time by a success outside of town, where we now and then find that, by the use of the same lime used at home and a local sand, we get better work than we receive at home. As it is only after several months' exposure to the air that lime mortars become fully carbonated, and get their consequent hardness and strength, there is doubtless a considerable proportion of out of town work which proves superior to that at home, and is unobserved by architects and builders, they having left the work before it has nearly reached its ultimate hardness. So far as the writer has taken the testimony of close observers, they agree that the mortar of plastering here is inferior to that of many other places observed, and often to that of other localities not far distant, where the same lime was used. That the sand is the chief sinner is shown again by the fact that some of the fine white sand underlying the blue rock gives often a harder brick mortar than is obtainable from the pit sand. These local pit sands are not extremely sharp, yet they are not so noticeably defective as to give rise to objection on that score.

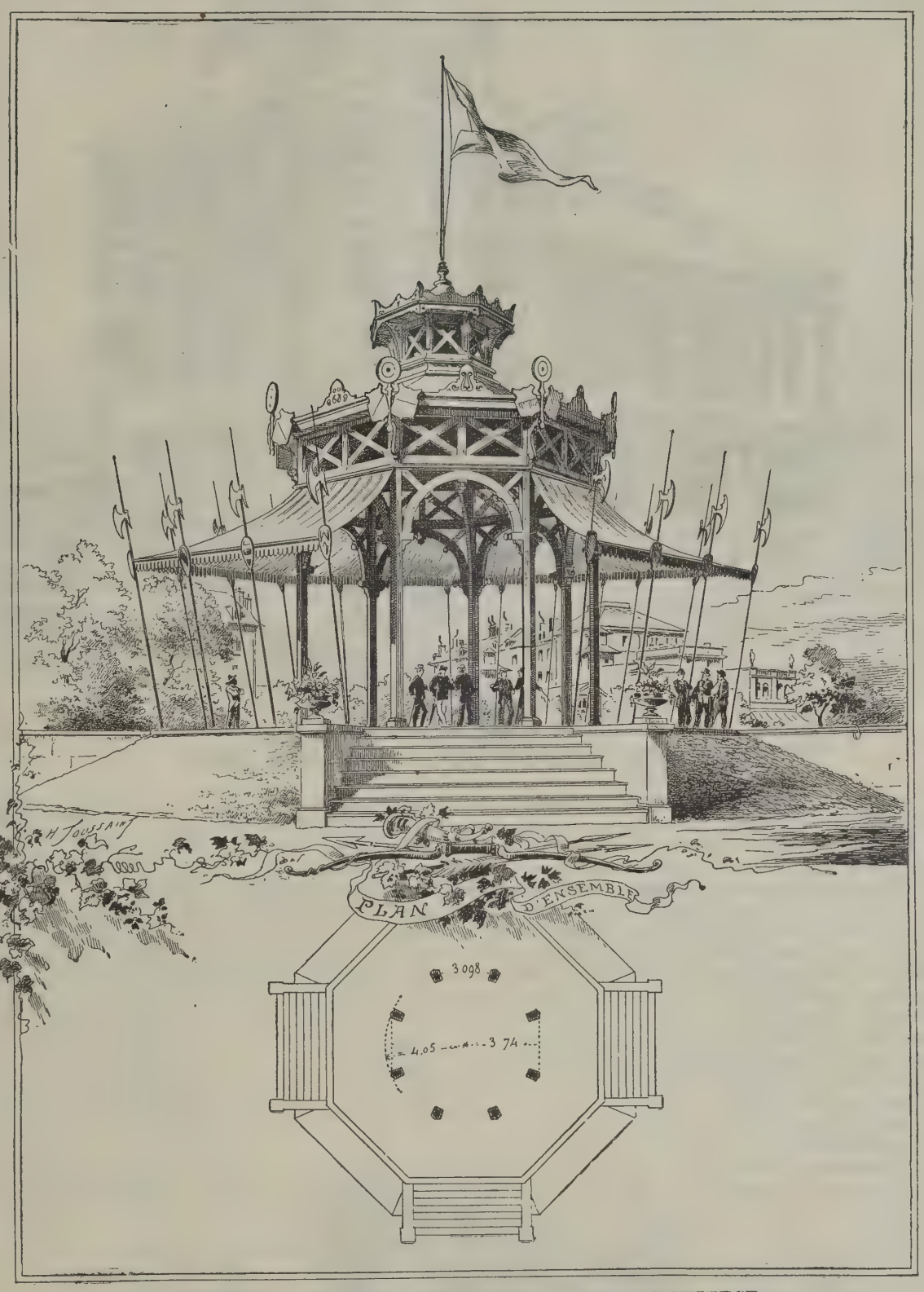
It is probable that very thorough washing of the sand would help, to some extent. Perhaps some simple expedient, such as adding a little acid to the water used in washing, might help.

Of course a large proportion of plaster cracks are due to shrinkage of timbers, but these and cracks due to settling are easily distinguished from those cracks which usually form one or more series and chase everywhere over the plaster, in some cases over plaster on brick walls. Again, we have a vast amount of plaster that never acquires suitable hardness, indicating with its lack of toughness an unsatisfactory chemical combination of the parts, in fact, very indifferent mortar, which is the rule with our plastering.

Mention of hair has been omitted above because any one is supposed to know when the mortar has sufficient to help the first coat to clinch properly, and it is supposed to perform no function except a mechanical one.

Sulphate of lime is sometimes substituted for lime in the first coat and sand in the last coat. It is doubtful if as strong mortar is obtained as when fat lime is used for the first coat, but the plaster of Paris sometimes admits of working at a season when frosts would injure quicklime mortar.

It will be remembered that a few years ago quite a furor was created over "stucco" plastering, and many thought some new discovery had been ushered in. One season of it proved enough. The sulphate is quite commonly mixed with common lime "putty" and troweled on for the last coat, but a last coat of fat lime and sand is certainly much harder ultimately.



RECEPTION PAVILION, GENEVA—M. JUVET, ARCHITECT.

More care should be taken with the backing or support for plastering. A large percentage of it is necessarily applied to laths of some sort. If of wood they form a much better support on timbers of twelve inches than of greater spacing, because of greater stiffness, enabling the float to make the plastering compact—a quality which cannot be overrated.

Lathing should be properly spaced to secure good clinches and fastened with larger nails than is common. Break joints as often as every third lath.

It lies with the architect to see that the timbering is properly joined, and so arranged as not to permit unequal shrinkage.

There is no longer any question about the value of some of the "sheathing laths" or matched boards grooved with "dovetail" shaped grooves. They have passed the probational stage successfully. They offer much better opportunity for "clinch" than do the common lath, their shrinkage is not such as to crack the plaster, they stiffen the walls or ceilings to which they are applied, and while they are of considerable warmth they also prevent breaking through the walls, and on ceilings often prevent staining through. Cracks are much less frequent in plaster applied to these "sheathing lath" than on the common laths.

Stains due to wood laths will not occur if the first coat or coats be heavy and well dried before the finishing coat.

Metallic laths are now to be had in considerable variety. The plain iron should not be used in exposed positions unless plastered on the back side too with a coat of fat lime mortar to protect from destruction by rust. In ordinary positions a coating or dipping in a thin paste of fat lime would be a good enough protection, but for sites greatly exposed to moisture give me the galvanized metal. The wire lathing furnishes excellent "clinch," but in some systems wants stiffness.

Corrugated lathing is made which has the requisite stiffness, but falls short of the wire in the matter of clinch. It much more than makes up for this, however, in greater stiffness and the lateral support it gives to individual timbers. In clinch and stiffness both it is far superior to wood lath.

The surface of plaster formerly received a larger share of attention than now, and scarcely anything about modern building is more to be regretted than the present practices of coating with colored washes put on with animal matter as a vehicle, or covering with paper attached by an easily decaying vegetable paste.

These kalsomining colors are very inferior in effect, and the glories of wall paper never strike people of good taste favorably. From a sanitary standpoint, both are abominable. Imagine a hospital ward on a hot, moist summer day with kalsomined or paste and paper covered walls. We have an inheritance of great value in the knowledge of how those who have gone before did those things.

Moulding within reasonable limits is excellent, but was so overdone when last the mode, that it recovers its true position with difficulty. Something akin to sgraffito decoration might be done with good effect, but would require workmanship of a high class. Coloring in the finishing coat has been done with a considerable degree of success. The effect is not brilliant at all, but when left from the float a very pleasant effect is obtained. I have never seen coloring effectively used in a troweled coat. It seems to be dragged along unevenly by the trowel. Among the earliest methods of treatment of plaster was what centuries later the Italians christened fresco—good fresco This consisted in coloring the freshly laid plaster with water

colors. The plaster in drying crystallizes the color with itself, so to speak, and the color will not wash off except with enough friction to wear into the surface of the plaster.

The important things in all of this coloring in the last coat or on the surface are two :

1st. Have lime slaked some months before using, and keep in paste form under water or otherwise sealed from the air. 2d. Use substantial mineral colors—ochers, siennas, iron oxides, cobalts, etc.

For surface coloring light tints are obtained by the use of slaked fat lime. Some of the natural cements might be used with advantage in mixing some colors. For rather simple wall coloring, such as will permit finishing a room in one day, for instance, this surface method has but one drawback, and that is the carelessness of workmen who come after and finish the room in woodwork, etc. They have no respect for plastering, and expect it to be patched up after them ; and the colored plaster meets with hardly more respect than the common hard finish. The effect of these "fresco" colors if skillfully laid on is very superior.

This fresco process is honored with a great history, and has preserved to us about all the knowledge we have of ancient painting. Vitruvius wrote that colors applied in this way would last forever, and the work of the buried cities near Vesuvius seems to bear him out. It obtained down to the time of the Italian masters, much of whose pictorial work was done in fresco. Some of them, however, "retouched" with "distemper," the vehicle being white of egg, and as a result now and then a "high light" becomes a black spot.

The Germans now use a modification of fresco which doesn't require the work to be finished while the plaster is still wet, as the whole is treated after decorating with a "liquor of flints"—probably a soluble potash silicate. If a little divergence may be permitted here, it will be made use of to note that experiments with the silicates, or with it and chloride of calcium, as used by Mr. Ransome, of artificial stone fame, might result in greatly hardening the plaster.

Another method of coloring which is probably surest of good results is the encaustic, or the use of melted wax as a vehicle—in old times melted in by heat, but now applied in a solution of spirits of turpentine. It is not very likely that this may be accomplished cheaply, however, unless we take into account the greater certainty and better results.

Oil colors being a method of decorating common to all sorts of surfaces, are only referred to here by way of comparison, and to note special difficulties which they present. They are not cheap, as a large amount of stock is required for use in plastered walls; and the effect is not good compared with either of the above processes. Certain "sizes" are valuable preludes, as preventing the absorption of so much stock by the plastering, and on freshly laid plaster an application of mild acid is said to hasten a condition favorable to the reception of oil colors.

Combinations of modeling of the surface of plastering and of color have given us the great glories of the Alhambra. Combinations of modeling and carving in plaster are strictly in order.

In fine, there is no branch of building more worthy of careful work than plastering, its support and its decoration.—*N. W. Architect.*

THE RAILROAD MEN'S HOUSE.

Cornelius Vanderbilt did something very practical and very praiseworthy for the benefit of the railroad employes who come and go from the Grand Central Depot, in this city, when he spent $100,000 in building a club house for them. It was lately opened for the first time, and Mr. Vanderbilt, with a numerous gathering of ladies and gentlemen as his guests, was present to formally turn over the house to the use of the men and inspect the arrangements that had been perfected for their benefit. The building is situated on Forty-fifth Street and Madison Avenue, and is, in fact, a club house of the very best type, the equal of any other in the city, and much superior to many in all its appointments. Picturesque, without being gaudy, outside, it is a charming addition to the neighborhood, and its sumptuous interior has been so arranged as to make it a place of resort in every way suited to the peculiar wants of the railroad employes

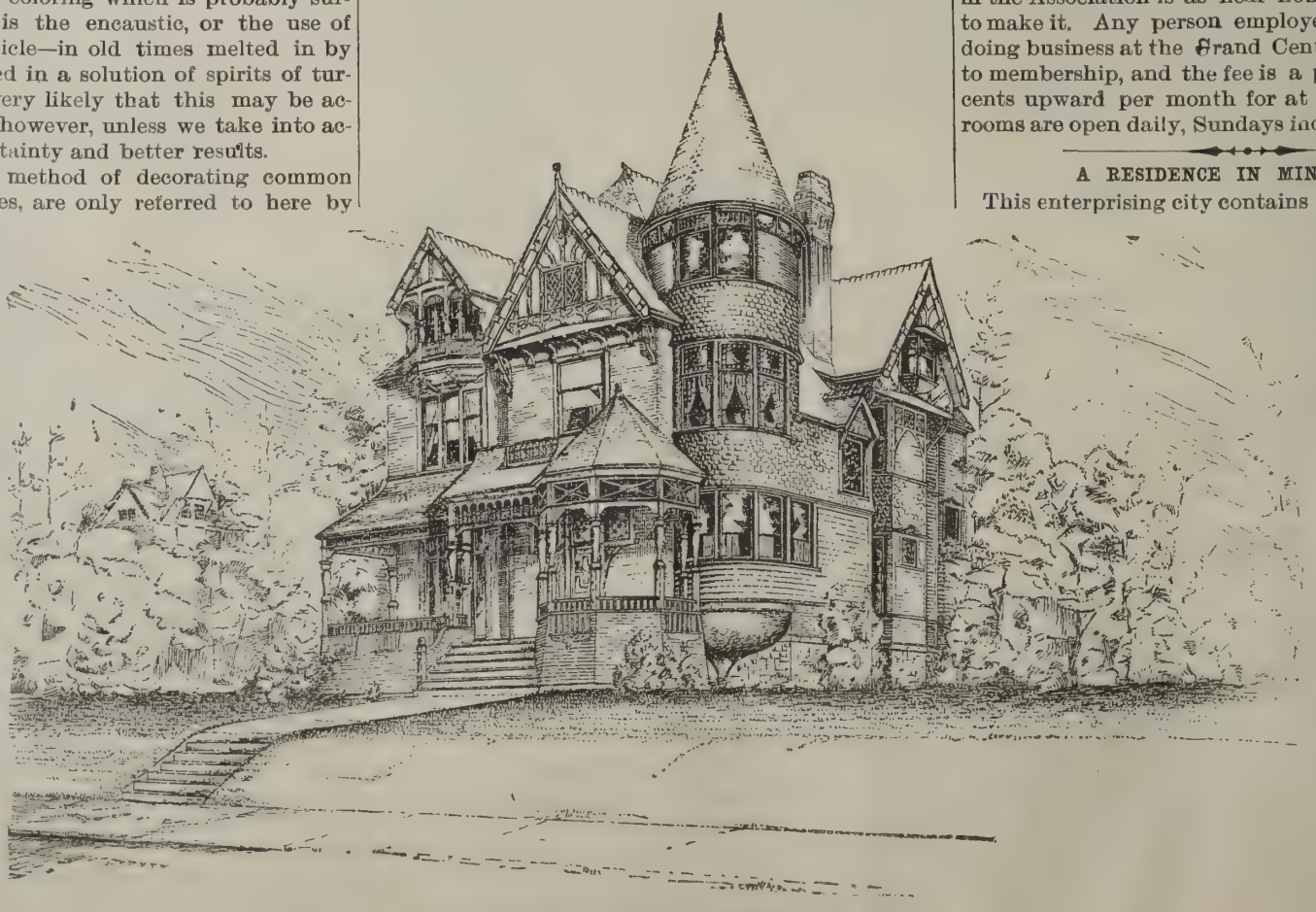
THE NEW RAILROAD MEN'S HOUSE, NEW YORK.

The entrance to the edifice is on Madison Avenue, and the broad hall is fitted up with tile and solid ash. In many of the furnishings the quality of the materials is fully up to anything the best private houses of the city can show. The various features of the club rooms scattered through four stories include a reading room, supplied with ninety-five daily, weekly, and monthly papers, a library, in which are 6 500 volumes, selected with great care and with special reference to the needs of railroad men, several social rooms furnished with checkers, chess, dominoes, crokinole, piano, etc., a gymnasium equipped with the latest improved apparatus of best designs, bowling alleys splendidly built by best makers and supplied with balls of all sizes, bath rooms, tub, shower, and needle baths, hot and cold water, dining room, and sleeping rooms for men detailed in the city over night.

A large hall is provided, and here a series of meetings has been arranged of an entertaining and instructive sort. There will be dinners, too, on anniversary occasions. Midday meetings and concerts are peculiar features of this club house, for many of the railroad men have a leisure spell of several hours in the middle of the day. There will be practical talks by practical men, and medical talks, with a class in the simple rules of first aid to the injured. Classes will be organized in drawing, penmanship, and in vocal music, the last named including the proper intonation in shouting out the names of railroad stations. The whole plan is an extension of and outgrowth from the railroad branch of the Young Men's Christian Association, and now there is not one of the hundreds of Association buildings in the country which is better provided in its field of being a resort for members. Membership in the Association is as near nominal as it is possible to make it. Any person employed by any company doing business at the Grand Central Depot is eligible to membership, and the fee is a payment of from ten cents upward per month for at least one year. The rooms are open daily, Sundays included.

A RESIDENCE IN MINNEAPOLIS.

This enterprising city contains many attractive residences, and among them is that of C. E. Phillippe, of which we give an illustration. C. S. Sedgwick, architect. We are indebted to the *N. W. Architect* for the drawing. The design is in many respects very pleasing.



A RESIDENCE IN MINNEAPOLIS, MINN.

The English army consists nominally of 211,474 officers and men, but it is said that only one army corps can actually be put in the field, and that only by frantic makeshifts. Of the 71,810 officers and men stationed in England, it is alleged that 15,000 are boys under 19, and that 10,00 more are under 20.

A CHURCH OF MODERATE COST.

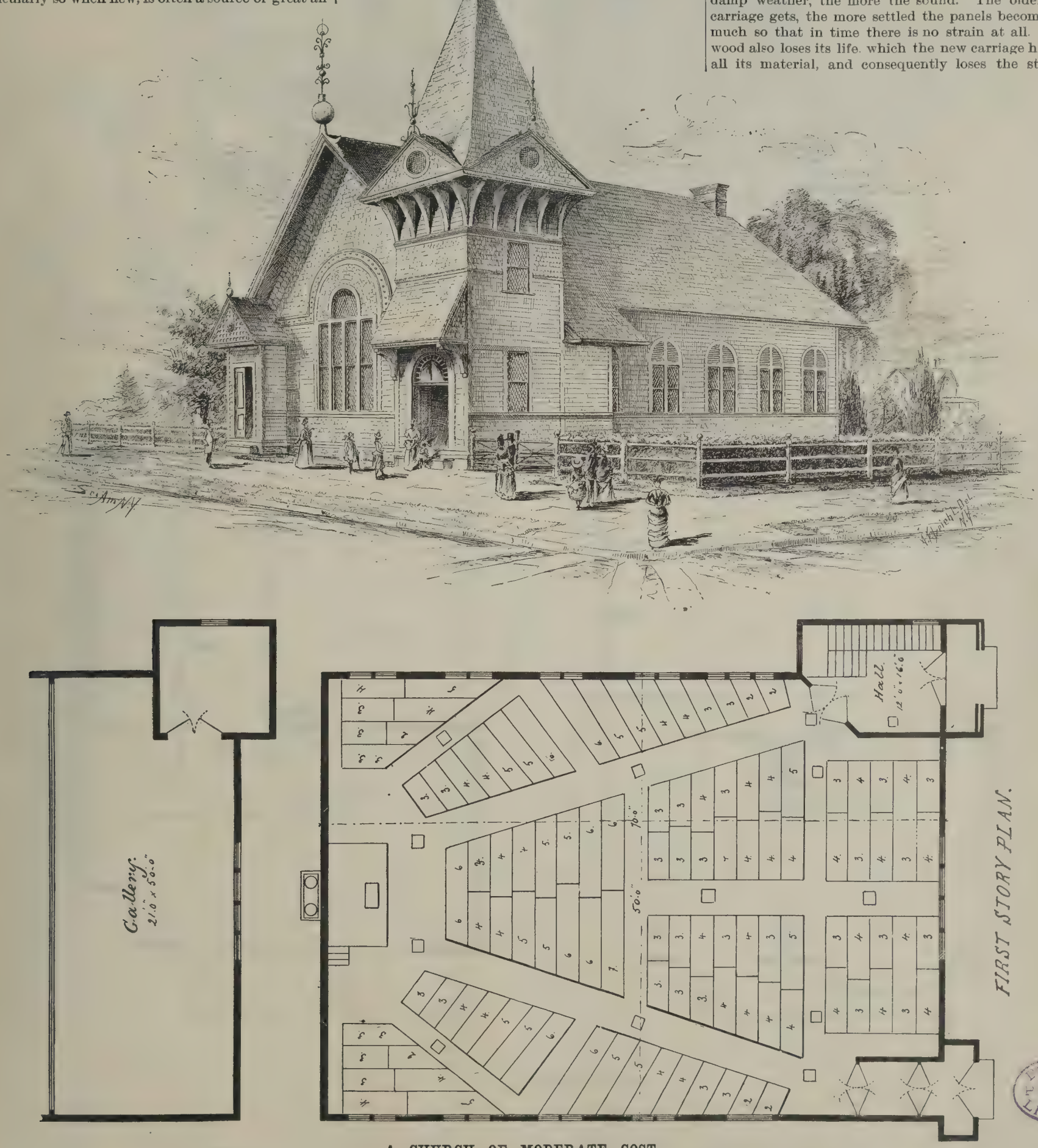
The size of structure is as follows: Front, 50 ft., exclusive of towers; side, 70 ft., exclusive of vestibule.

For arrangement of pews and interior, see floor plans.

Heights.—Cellar, 7 ft.; auditorium, 16 ft. on the sides, and finished up on roof trusses.

Materials.—Foundation, stone; sides and ends, clapboarded; gables, shingled; roof, shingled; cost, $6,000, exclusive of pews.

Special Features.—The gallery supported by iron columns. Entrance at either side. Double swinging doors preventing draught from blowing in. Inside finished in yellow Georgia pine, floor also of Georgia pine. Intended for 450 seats.



A CHURCH OF MODERATE COST.

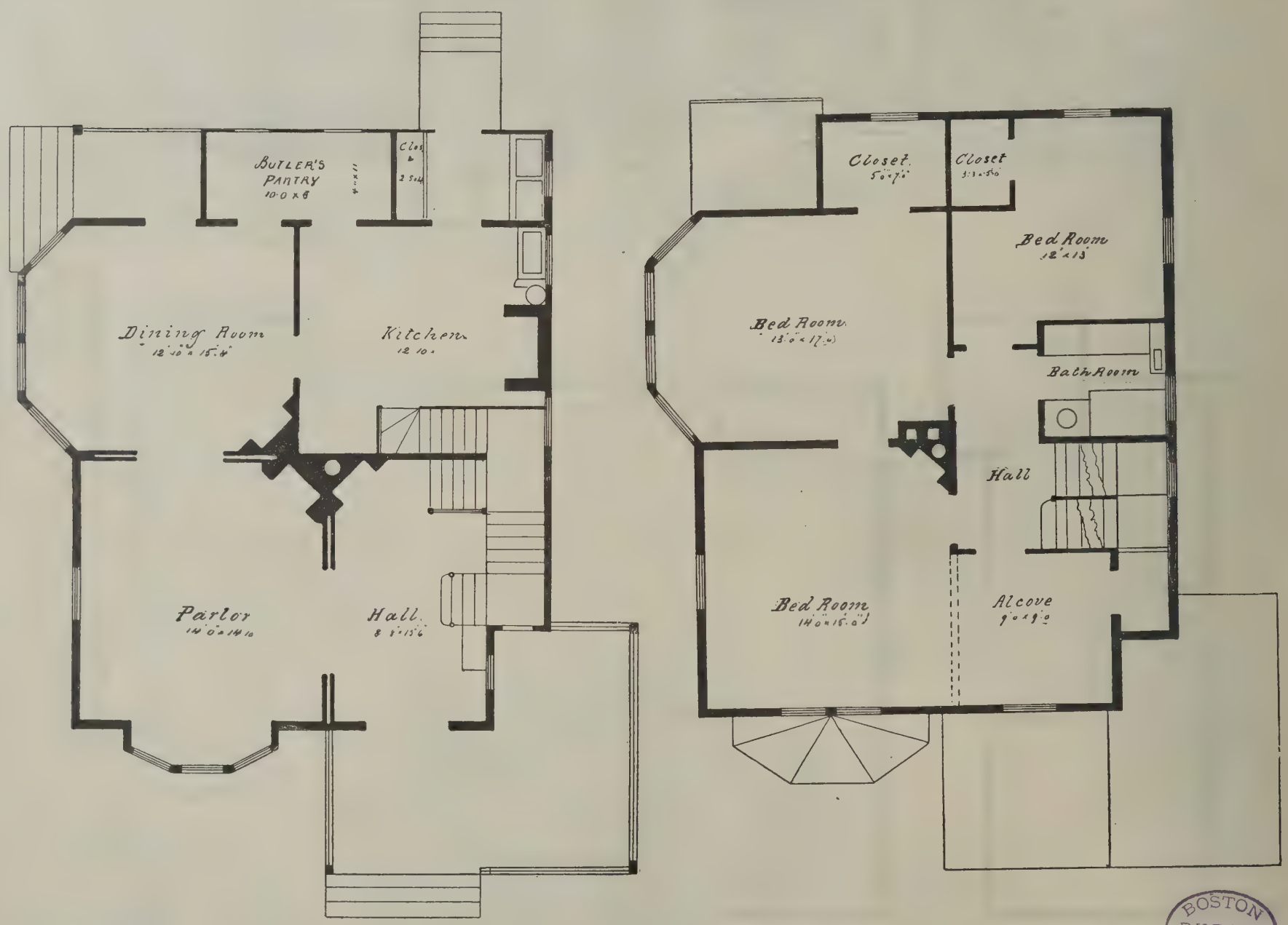
The Rumbling Sound in Closed Carriages.

The rumbling, drumming sound in closed carriages, particularly so when new, is often a source of great annoyance to carriage builders. The owner objects to it, claiming that his old carriage made no sound when riding over the road, and the builder knows perfectly well there is no remedy to prevent the sound in new work. Sometimes other noises are mistaken for this peculiar sound, made either by the locks, window frames, or doors. The builder can prevent the locks from rattling by adjusting them carefully. He can also fasten the glass frames so as to prevent any movement up, down, or sideways and the doors also be fixed so as to produce no noise if the body is well built and the rocker plates strong enough to carry the intended weight, but the rumbling sound is produced by the body itself on account of its peculiar construction.

If we have a carriage body only paneled half way up, no sound is discernible, because the body is open above the side panels. The sound is only created by closing the carriage, and the closer we make them, the more sound we obtain. It may be a question with some why there is more sound in a new carriage than in an old one. Many claim that what holds good for an old job should also be applicable to a new one, but this is not so here. Let us go over the method of construction of a brougham or English coach body. The body is a mere skeleton. It has a good foundation, composed of wood and iron, upright pillars stiffened lengthwise with pieces to support the edges of panels and also its centers. Cross bars and curves are made for the same purpose. Over these bars, side pieces pillars, strainers, and curves, the body is covered over with panels and boards, and nearly all these panels are curved, and sometimes curved from both sides lengthwise and crosswise.

It is a common practice, and, in fact, necessary to produce good work, that all panels should be strained or forced together crosswise, and the wider the panel the more it is strained, that is, the panel is put on wider than the necessary space on the body. If the panels are perfectly dry they are not strained, nor is it necessary, because if the atmosphere changed to dampness, the panels would swell, bulge out at the weakest place, and force themselves from the body. There is, nevertheless, more or less strain, the most being in the top panels when made out of small boards. They are only put on when perfectly dry, the last part being wedged in, covered over from the outside with fine muslin, and the consequence is it will act on the principle of a drum; this being the case with all the panels on the body, and the newer the body, particularly in damp weather, the more the sound. The older the carriage gets, the more settled the panels become, so much so that in time there is no strain at all. The wood also loses its life, which the new carriage has in all its material, and consequently loses the strain, which is one reason why there is no sound in old carriages.

This sound can be greatly, if not altogether, prevented, if all the panels, particularly the roof boards, are blocked, that is, take 1 inch square blocks, ¼ inch thick, and glue the blocks tight to each other over the entire surfaces. This prevents all panels from splitting also from warping, shrinking, and swelling, and deadens the sound to a minimum. These blocks are taken from waste pieces of roof boards, either of pine, poplar, or basswood.—*Carriage Monthly.*



FIRST STORY PLAN. SECOND STORY PLAN.

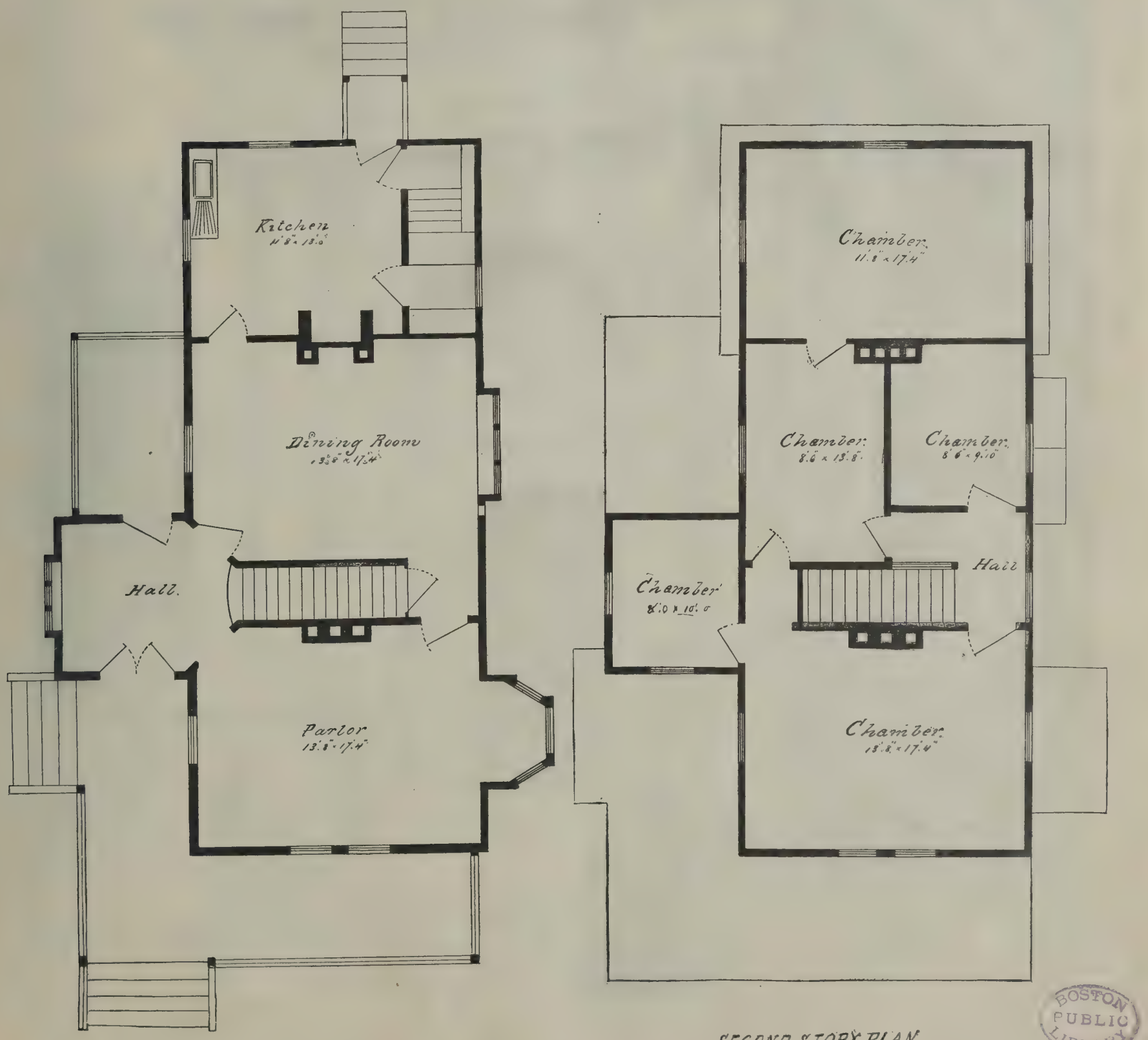
A THIRTY-SEVEN HUNDRED DOLLAR HOUSE.

A THIRTY-SEVEN HUNDRED DOLLAR HOUSE.

Our engraving shows a two story and attic house erected at Montclair, N. J., at a cost of thirty-seven hundred dollars. It is 30 ft. wide over all and 37 ft. deep, exclusive of piazza; has all the modern conveniences, including furnace. It has a central chimney, with fireplaces in each room. It has a solid stone foundation. The attic is finished. It is a satisfactory, convenient dwelling, and presents an excellent appearance.

Typhoid.

Typhoid fever is prevalent in many towns in this latitude at this season. That it is largely due to the use of contaminated well water, statistics compiled by a writer in the *Journal*, published at Lansing, Mich., concerning some cases of the disease in that city, illustrate pretty clearly. Fifteen physicians reported seventy-eight cases of typhoid fever. Of these seventy-eight persons who were sick on Sept. 9, only nine were using water from the new city water works, the remainder all using well water. Some of these nine persons were using well water, but had changed to hydrant water on the advice of the attending physicians. There is a positive conviction that wells from which these languishing sufferers took their supply of drinking water were contaminated, and are to-day contaminated. with organic pollution. The reader at once says: "Why do they not use water from the public supply,



FIRST STORY PLAN

SECOND STORY PLAN.

A THIRTY-FIVE HUNDRED DOLLAR DWELLING.

then?" This question is a pertinent one, but does not apply in these cases, as every one of them lives in houses at which the public supply is inaccessible. The moral is that the city should extend its mains, condemn old wells, and thus compel people to take advantage of a public benefit.

A THIRTY-FIVE HUNDRED DOLLAR DWELLING.

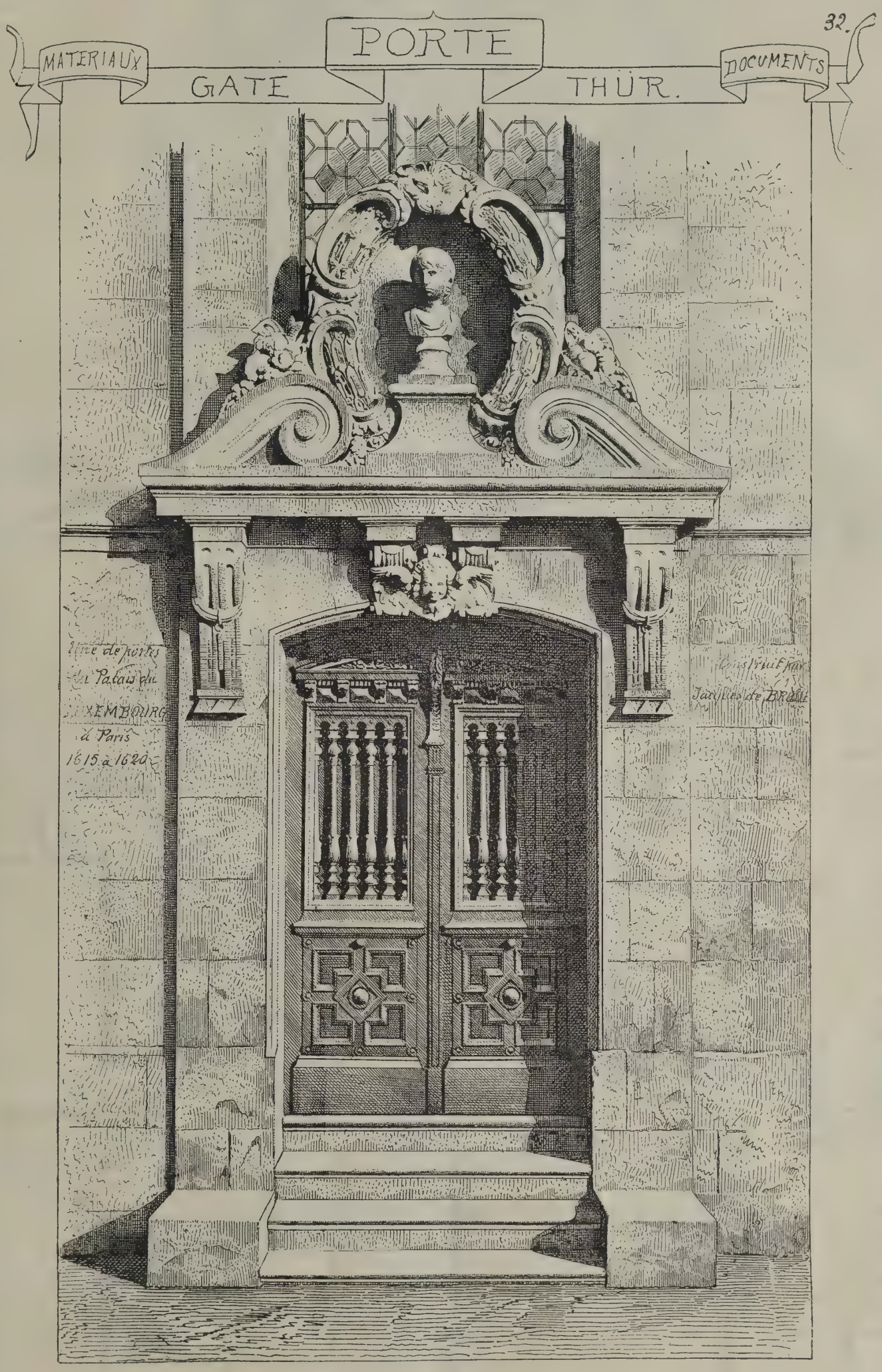
Our engraving illustrates an attractive dwelling which has been erected in this vicinity, at a cost of thirty-five hundred dollars The plan gives much satisfaction. The length is 40 ft. by 26 ft. width. There are roomy piazzas, and the house is supplied with all the modern conveniences. Complete plans and specifications, with elevations, sections, sheet of details. bill of estimate for materials, and everything complete ready for the builder, may be obtained at this office. The same remarks pertain to the various plans illustrated in this periodical.

THE NEW MONUMENT AND TOMB OF M. THIERS.

The monument erected to the memory of M. Thiers in the cemetery of Pere la Chaise was inaugurated on he 3d of September. The edifice, which was constructed by Architect Aldrophe, is situated on the summit of a hill to the right of the cemetery chapel. It represents a Renaissance chapel 45 feet in height, and occupying an area of 172 square yards.

On each side of the front, two Corinthian columns resting upon a granite base support the entablature and the attic that crowns the structure. In the center of the attic, a large tablet of green porphyry carries this device in gold letters: *Patriam dilexit. Veritatem coluit.* The entablature consists of modillions with dentals of a very pleasing effect. Between the columns stands the portico, and, in the center, the door, which is reached by nine steps. This door, which is of bronze, is 6½ feet in width by 13 in height. It is surrounded by a frame with attic, above which, in the arch of the portico, there is a superb bass-relief by the sculptor Chapu. A single block of stone was used, but of dimensions such that it became necessary to get up a system of special vehicles to carry it. It took twenty horses of extraordinary strength to haul it to

THE NEW MONUMENT AND TOMB OF M. THIERS, CEMETERY OF PERE LA CHAISE, PARIS.



DESIGN FOR AN ENTRANCE.

its destination. The eminent sculptor has represented the genius of patriotism. In the background, France is seated upon a broken column and holds a flag in her left hand. In the foreground, the genius of patriotism, with outspread wings, stands in front of her, as if to protect her, with saber in hand. At his feet is the corpse of a young man, and in the rear are flames, emblems of war. Above this great *motif*, in the tympans, two genii, one holding a pen and representing Letters, and the other bearing a torch and representing the Sciences, personify the inclinations of a man who was both an eminent writer and a learned historian

In the center, the key supports M. Thiers' cipher, surrounded with laurel leaves.

The two ends are ornamented with pilasters of Corinthian order corresponding to the columns A large arch, recalling that of the entrance, serves to illuminate the interior of the monument. This arch is closed by a bronze casting from the founder Roland. As sculptural *motifs*, the ends carry two dies recalling the name of the Dosne family.—*L'Illustration.*

Pipes and Joints.

Architects' specifications are not very explicit about the fixing of vertical and horizontal lines of piping—matters which are considered beneath professioal attention and care. These details are left to the builder or the foreman to look after, with the result that in a few weeks or months after the completion of the building, inconveniences are suffered owing to leaking of soil or of water pipes. The cast iron rain water pipes break away from their connection with the head, or the joints open through the lengths not being firmly held up by proper pipe supports in the walls. What is commoner than to find that the drain pipe or trap has separated from the vertical stack of pipes, causing a leakage of the rain water through the wall? The papering of a room gets irretrievably spoiled or discolored before the fault is discovered and rectified. A few plain rules are required to be observed in making the joints of cast iron socket pipes for drainage purposes, or wherever leakage is to be prevented. One of the best plans is to insert a gasket of picked oakum into the space between the spigot and hub, filling up the space with molten lead. The lead is afterward consolidated by means of calking tools, and if done properly a water tight joint can be made in this manner. To secure iron pipes to a wall, various plans are adopted. Iron hooks are generally used to clinch the pipe; but a proper mode of fixing can only be insured by giving each pipe length a solid rest or an iron support let into the wall, to take the socket or hub of each, so that the weight may bear on it. There are now introduced fastenings which keep the pipe a little away from an outer wall, so that in case of overflow from the gutter or head the water runs down the spout, and does not touch the wall. In America expanding conductors are used, so that during freezing weather the seams open and prevent the pipe from bursting. These pipe fasteners can now be obtained if architects only take the trouble to specify them. In very lofty buildings the contraction and expansion of these pipes ought to be provided for, especially in waste pipes receiving hot water. The failure in the joints often arises from two different kinds of pipe coming together. The joints, for example, between stoneware pipes and iron pipes are seldom found perfect. The use of brass couplings or ferrules is preferable to cement, the iron pipe being securely calked at the end. The jointing of wrought iron pipes is best done by screw threads smeared over by a thick paste of red and white lead and boiled oil. For lead pipes wiped or blown joints are used. The latter, if properly done, will answer for cold supply between cistern and tank or cylinder. In iron service piping for gas the runs should be carefully marked, and be as straight as possible, avoiding bends. One of the chief directions to be observed by the gas fitter is that the pipes should not be laid level, but should have a fall to the main or toward the meter. Every fitter is supposed to know this condition, to avoid the accumulation of condensed vapor in the pipes, and also that every socket and joint should be white-leaded so as to insure air-tight junctions. Strange to say, however, the modern system of laying pipes is often sadly at fault, and whether it be the sanitary fittings, the water supply, or the gas service, it is not uncommon to find these rules neglected.—*Building News.*

Jack Frost in Water Pipes.

Among the popular fallacies none is more prevalent than that relating to the expansion and bursting effects of ice in our water pipes. Even among intelligent plumbers the belief seems to be very general that the mischief takes place when the ice commences to melt; and, in fact, it is only a week ago that we read in one of our scientific exchanges that it was well known that water expands as it first congeals, and also goes through a second course of expansion as it first commences to melt—a scientific paradox which the writer makes no attempt to explain, and which, as a matter of fact, exists solely in his imagination. It is somewhat laughable to hear some people descant upon the best means of thawing pipes so as to avoid bursting. Some advocate a gradual melting of the ice, while others are in favor of a hot douche which will heat the exterior first. The effects, however, are just the same, for in either case whatever damage is to result from that particular freeze was done long ago, and the burst actually took place just *before* the freezing, rather than during the process. The pipe was cracked by the expansion, and a piece of ice protrudes through the aperture and serves as a plug to check the flow; but days, weeks, or even months afterward, when a warm thaw sets in, this ice gorge will be melted and the damage exposed. Pipes do not always burst after a freeze. Lead is very ductile, and will often yield or stretch enough to allow for the expansion of the ice without making an open fracture; but the pipe is gradually weakened by each successive freeze, and will become as thin as paper before giving way. Pipes are most likely to freeze at the top of a curve or bend, where some slight obstruction tends to collect the ice, which being lighter than the water rises in flakes, which soon become united in a compact mass.—*Sci. Arena.*

A HOUSE FOR $3,800.

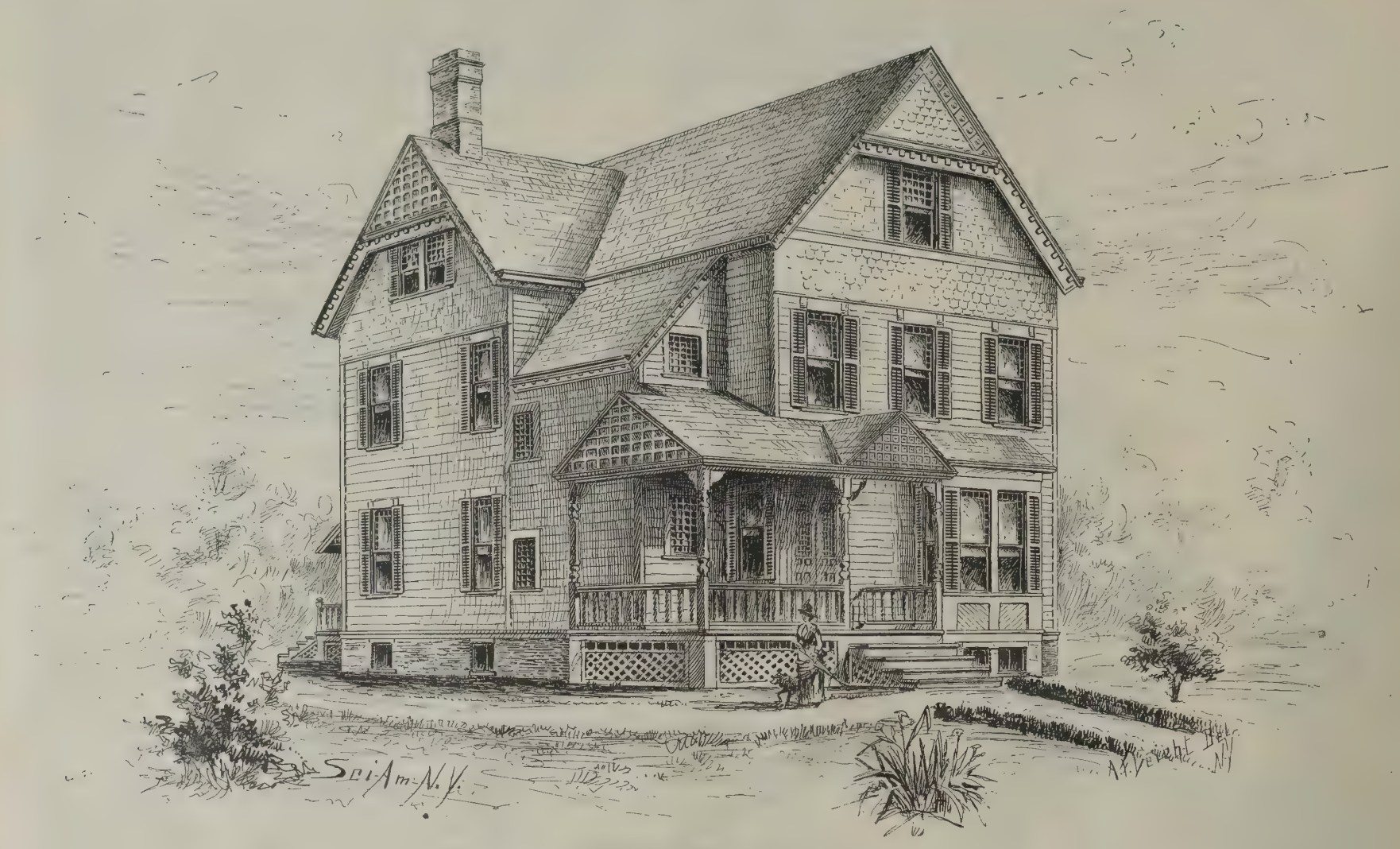
Size.—Front, 28 ft. ; side, 38 ft., exclusive of piazza and bay window. For size of rooms see floor plans.

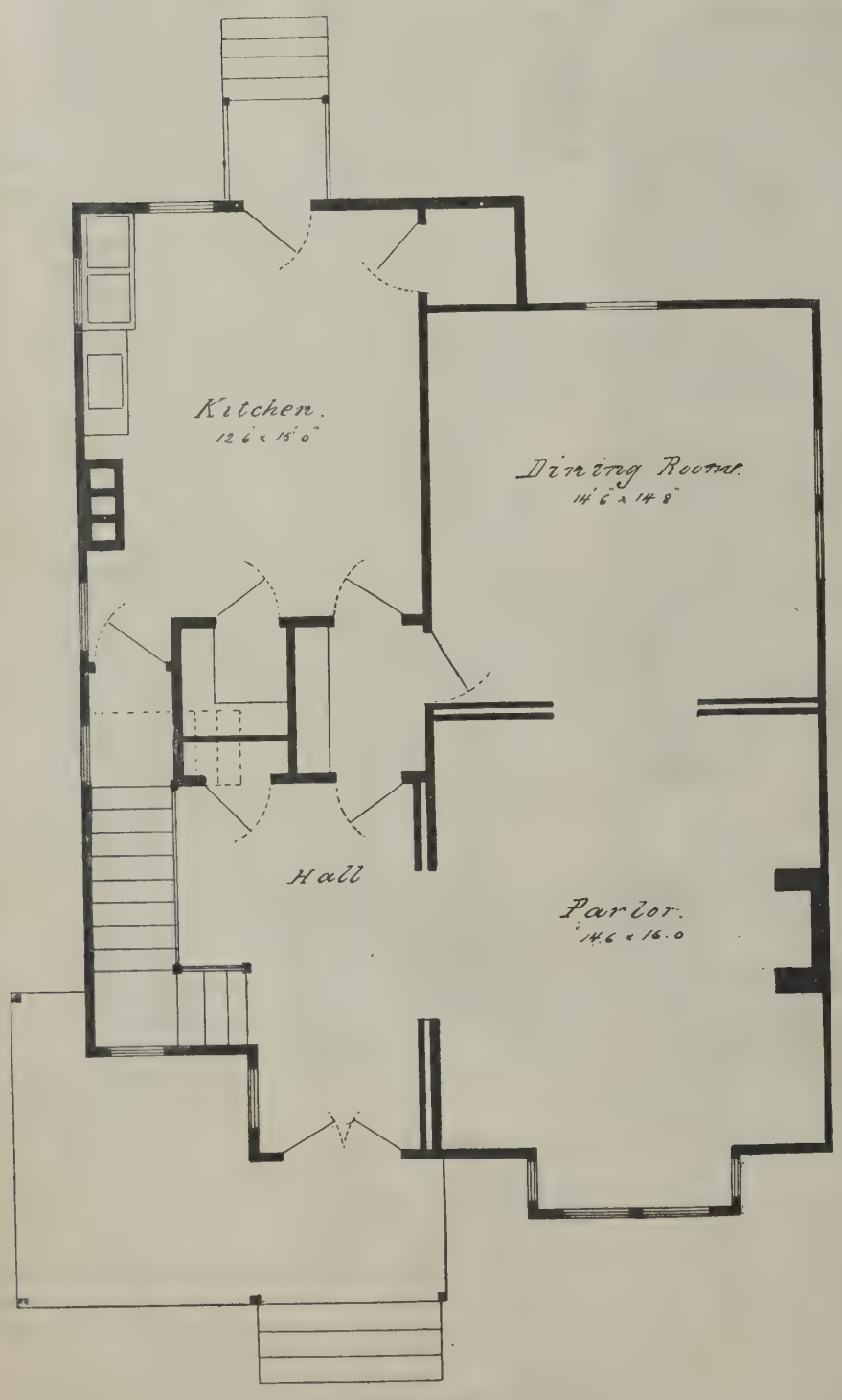
Height of Stories.—Cellar, 7 ft. ; first story, 9 ft. 6 in ; second story, 9 ft. ; attic story, 8 ft.

Materials.—Foundation, stone ; first and second stories, clapboarded ; gables, shingled.

This house has been built. The cost was $3,800, including plumbing, furnace, and everything complete.

Special Features.—Sliding doors connect the dining room, parlor, and hall. There are open fireplaces in the parlor and chamber. Closets are numerous and large throughout. Two bedrooms are finished in the attic. Cellar under the entire house, with cemented bottom.





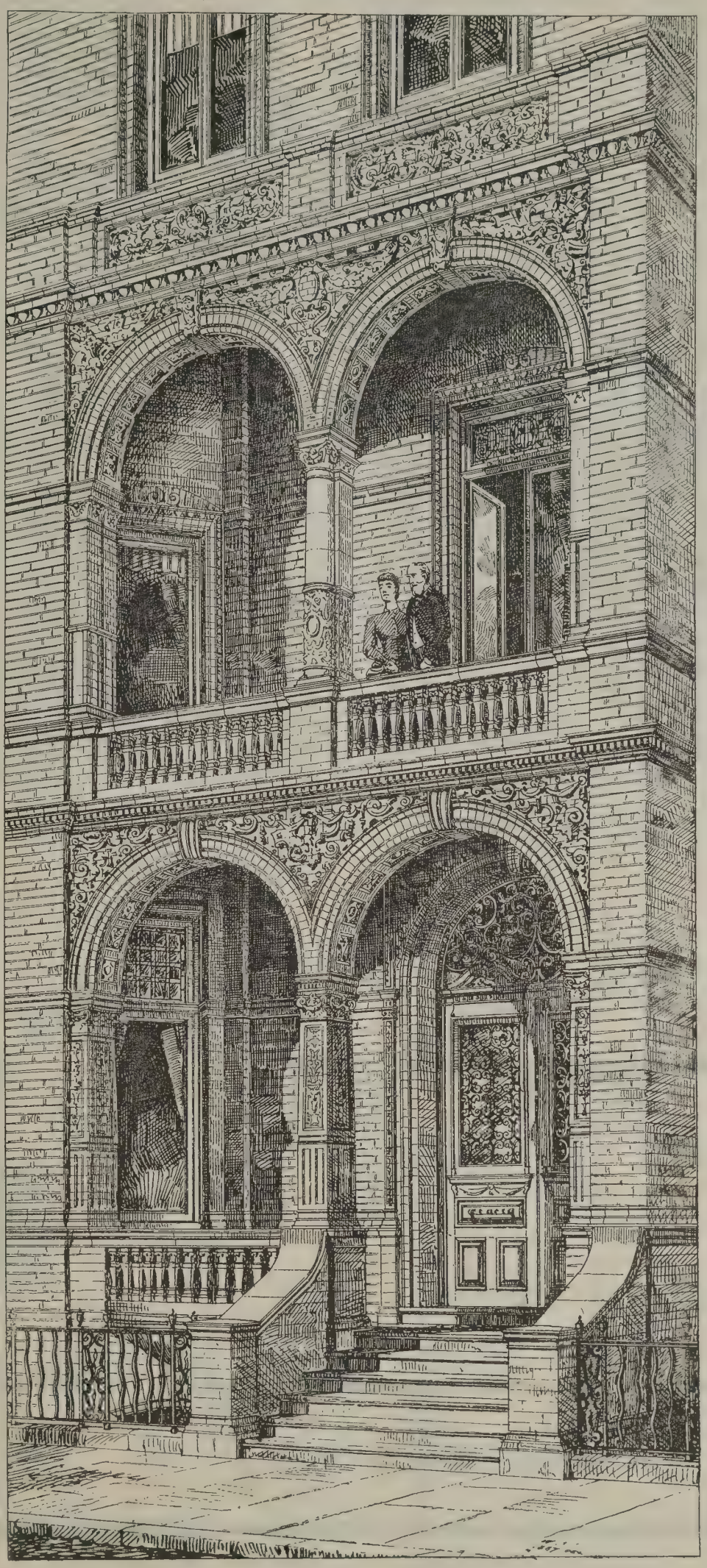
FIRST STORY PLAN.

SECOND STORY PLAN.

A HOUSE FOR $3,800.

A CITY FRONT.

This Royal Academy drawing shows part of a block of mansions now building in Grosvenor Square, London. These houses erecting at the southwest corner of Grosvenor Square are from the designs and are being built under the superintendence of Mr. W. H. Powell, architect. The buildings are faced with red pressed bricks, red rubbers being used for the gauged arches, carved frieze, spandrels, etc.—*Building News.*



DESIGN FOR A CITY FRONT—W. H. POWELL, ARCHITECT, LONDON.

The Effect of Freezing on Cement.

The effects of freezing on Portland cement mortar have not been found injurious. In America experiments have shown that masonry laid with Portland cement mortar has stood no ill effects from freezing, while the American natural cement mortars have shown disintegration to a considerable depth from the surface. Mr. Alfred Noble describes the building of piers of the St. Louis River bridge on the Northern Pacific Railroad, in the winter of 1884–85. Portland cement was used, the proportions of cement and sand being 1 to 1½ for face stone and 1 to 2½ for backing. During the freezing weather salt was used in the mortar, and the sand was warmed; but the mortar froze with the temperature at 20 degrees on the stone. After some time the mortar was found to have set firmly and as well as that used in the milder weather. Other experiences have confirmed the author's statement. The American natural cements, on the contrary, have been found to disintegrate during frost. The Rosendale cement has, for instance, been proved to weather badly on the surface. But if, during the cold weather, brine or salt water is used for mixing strong enough, the results have been found satisfactory, even with Rosendale cement, when a large proportion of cement is used. When a strong solution of salt is not used in mixing, the failure of the mortar is almost certain. The proportion of salt necessary may be gathered from the following rule: Dissolve 1 lb. of rock salt in 18 gallons of water when the temperature is 32° Fahr., and add 3 oz. of salt for every 3° of lower temperature. The masonry laid with mortar so prepared stood well. Many instances are recorded of the value of using Portland cement in places where the mortar is likely to freeze before setting. The use of salt in cement mortars also greatly increases their tensile strength under the conditions of freezing. Salt water is found, indeed, to be as good as fresh for mixing, especially in hydraulic works, though Mr. Faija concludes from experiments he has made that for marine purposes the portions of work below high water level should be mixed with fresh water, and those above it with sea water. There is clearly a want of agreement among English authorities upon the point; but if we take the experience of American engineers, the advantages of mixing with salt water are strongly made out.—*Building News.*

The Wood of Thuja Gigantea.

Thuja gigantea is, among the trees on the northwest coast, the Indian's best friend, for out of its wood and bark he manufactures endless varieties of domestic, hunting, fishing, and warlike utensils. Most of their canoes are hollowed out of it, at least in Vancouver Island; and there is a case quoted where a canoe made out of Cupressus nutkaensis, in Vancouver, was quite an exception, and indeed the canoe was probably traded from some of the northern tribes, and not of Vancouver manufacture at all. The Indian ropes are also very commonly twisted out of its bark. The tree which I took for Thuja plicata, and out of which I happened to see the Indians, just at the time I wrote the letter quoted, twisting ropes, I believe, from after investigation, to have been only a stunted form of T. gigantea, and that T. plicata is not a separate species, but for reasons which I have given in another place, and cannot now again repeat, is, indeed, only a variety of T. gigantea. North of latitude 53° Cupressus nutkaensis takes the place of Thuja gigantea, and is applied by the Indians to all the useful purposes of T. gigantea, and to some others in addition. For instance, at the Matlakatlah Mission on the coast of British Columbia, in about latitude 54° N., where there are fine groves of it, it is sawn into lumber and sent to Victoria, where it meets a ready sale among the cabinet makers, as it takes a fine polish and works beautifully. Most of the prettily polished disks and little cylinders used by the Indians in gambling are made either from this wood or from that of Acer macrophyllum. It is also valuable for ship or boat building. The wood of T. gigantea is whitish, but in its fresh state is yellower, hence the name "yellow cypress" applied to it. It is light, tough, durable, and easily worked. The property of durability it shares with T. gigantea, and in addition it has a pleasant fragrance. On this account the Russians about Sitka used to call it dushnik or "scented wood." It was absolutely at one time exported to China, and returned marked with Chinese characters, which warranted it as "real Chinese camphor wood," puissant for many purposes, and a sovereign remedy against moths in drawers! In repairing old Fort Simpson, the only log found sound after twenty-one years' trial of those used for "underpinning" was one of this. —*M., the Garden.*

A Dutch Interior.

Here is the favorite sitting room of the house, opening out of the hall and the *serre;* the "antique room," an excellent specimen of what several other Dutch gentlemen also have, or aim to have, for it necessitates, perhaps, years of careful collection and selection. It is a nearly exact representation of an old-fashioned sitting room, such as you shall see in interiors by Nicolas Maes. The Dutch are intensely conservative, loving their forefathers' ways and traditions, and treasuring their family heirlooms of old blue Oriental china, old native delf, carvings, brasses, fine engraved glasses, and notably their old silver. This room, as several others I saw, would give an impressionist the idea of brownness, brightened by brasses and blue china. Dark brown are the high wainscot, the paneled ceiling, carved chimney piece, and the beautiful old Cordovan leather wall hangings stamped in faded gold; brown also the carved stiff furniture and its cushions. But the gleam of old brass chandeliers and sconces brightens the gloom, many of the latter set round the wainscot ledge being of strange shapes an antiquarian would vainly covet. And besides the usual brass fire irons hung up on either side of the old tiled fireplace are some less known in England; a brass *repousse* box holding dried hempstalks to light candles, great snuffers, and a long blowpipe for the fire, also useful in extinguishing candles placed high. Two heavy brass handles depend also from the high chimney board, their use puzzling me. "What are they for?" "Why, for old gentlemen to hold by when lifting up one foot to warm their toes!" explained Hugo cheerily. "Our ancestors were heavy, you see, and could not stand long on one leg without support." After the brasses, the blue china relieves the eye in the rich somberness of the room. Big jars, and lesser porcelain of all shapes, are ranged on the wainscot and all about the room; with queer delft plaques showing sea pieces, and shaving dishes with nicks to hold the victim's neck.—*Illus. Mag.*

Spontaneous Combustion.

Shavings from the oiled wood used in the manufacture of planes at an Eastern factory were recently put into a barrel, and twenty-four hours later were found to be almost on fire, their temperature being over 300° F. Before six o'clock the shavings were charred and smoking a few inches beneath the surface. This is a practical demonstration of spontaneous combustion, and illustrates how many mysterious and destructive fires may have originated. Oiled rags and waste operate in the same way.

AN animal with the head and tail of an alligator and the back and claws of a tortoise is on exhibition at the store of George Hulse, a Liverpool importer of turtles. It is called an alligator tortoise, and was captured by an English sailor in the swamps near New Orleans. The English naturalists have never seen anything like it before, and are trying to buy it for a public museum.

A HOUSE FOR A NARROW LOT.

The size is as follows (not including verandas and bay windows): Front, 20 ft.; sides, 49 ft. 6 in.

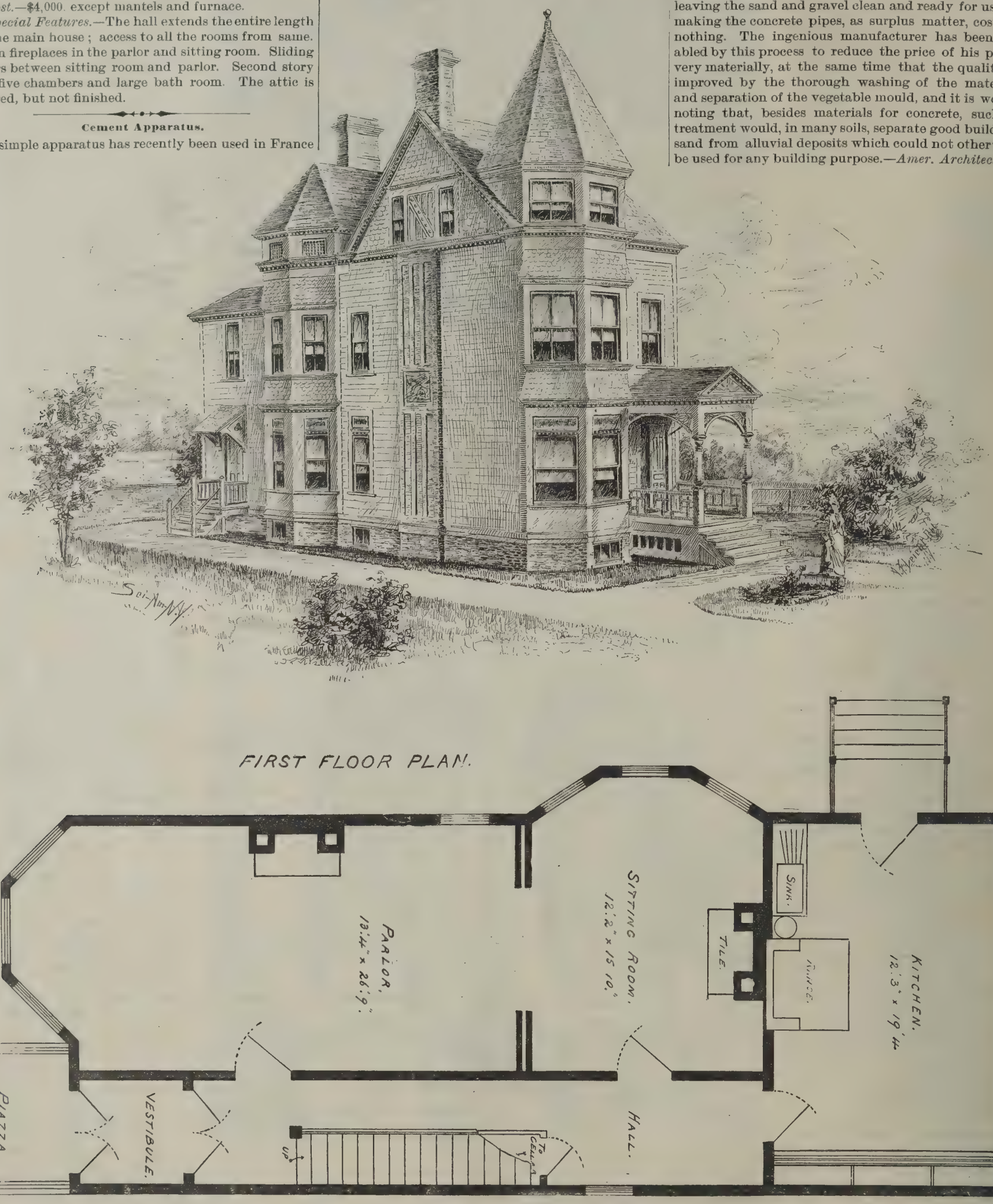
For size of rooms see floor plans

Height of Stories.—Cellar, 7 ft.; first story, 10 ft.; second story, 9 ft.; attic, 8 ft.

Materials.—Foundation wall, brick; first and second stories, clapboarded; gables and band courses around octagon, shingled; roof, slate.

Cost.—$4,000. except mantels and furnace.

Special Features.—The hall extends the entire length of the main house; access to all the rooms from same. Open fireplaces in the parlor and sitting room. Sliding doors between sitting room and parlor. Second story has five chambers and large bath room. The attic is floored, but not finished.



A HOUSE FOR A NARROW LOT.

Cement Apparatus.

A simple apparatus has recently been used in France for preparing the ingredients of concrete, which might, we should suppose, be used in works on a large scale with considerable advantage. As described in a letter to *La Semaine des Constructeurs*, the apparatus, which seems to have been originally devised by a manufac turer of concrete sewer pipes, consists of a cylinder of copper, about three feet in diameter, mounted on a hollow shaft, which is pierced with many holes. The cylinder is also pierced with holes of varying sizes, arranged in zones, and a helix of copper is set in the interior. By a simple mechanism, driven by water power from a brook, the cylinder is made to revolve about once a minute, and at the same time water is forced under pressure into the hollow shaft. Earth from the gravel bank near which the machine is set up is then thrown by shovelfuls into the upper end of the cylin der. The interior screw drives the material forward, at the same time that it is washed by the water issuing from the hollow shaft. The holes in the upper part of the cylinder are the smallest, and the turning, shaking, and washing of the earth sifts out there the finer portions, while the rest is moved along to the next zone of larger holes, which allow the coarser gravel to escape, the small pebbles falling through the next zone, and the larger ones remaining till the last. The different sorts of material are collected in bins, and the washing water, which holds in suspension the fine sand and loam, is allowed to run off into a basin, where it is lightly stirred with paddles agitated by the same power that drives the cylinder. In this basin the fine sand is deposited, but the movement of the water prevents the subsidence of the loamy particles, which escape through an overflow into another basin, and are there allowed to settle quietly. The material shoveled from the bank is thus, by one operation, sorted into large pebbles, small ones, of two or three distinct sizes, gravel, sand, fine sand, and loam. The large pebbles, which are unsuitable for use in making the concrete pipes, are sold for road metal or similar purposes; and the fine, soft deposit of loam in the last basin is disposed of to farmers for manure. The proceeds of the sale of these two products are sufficient to pay the whole expense of handling and treating the earth, leaving the sand and gravel clean and ready for use in making the concrete pipes, as surplus matter, costing nothing. The ingenious manufacturer has been enabled by this process to reduce the price of his pipes very materially, at the same time that the quality is improved by the thorough washing of the material and separation of the vegetable mould, and it is worth noting that, besides materials for concrete, such a treatment would, in many soils, separate good building sand from alluvial deposits which could not otherwise be used for any building purpose.—*Amer. Architect.*

To Repair Stone Steps.

To restore stone staircases of which the steps have became worn, the *Semaine des Constructeurs* advises that the worn parts be moistened with a solution of silicate of potash (soluble glass), and then that the step be given its original form by means of a paste composed of hydraulic lime and silicate of potash to which fifty per cent. of fine silicious sand is then added.

The durability of the steps thus restored is comparable to that which would be obtained with the best stones, and the adhesion of the added portion is perfect.

A $4,500 RESIDENCE.

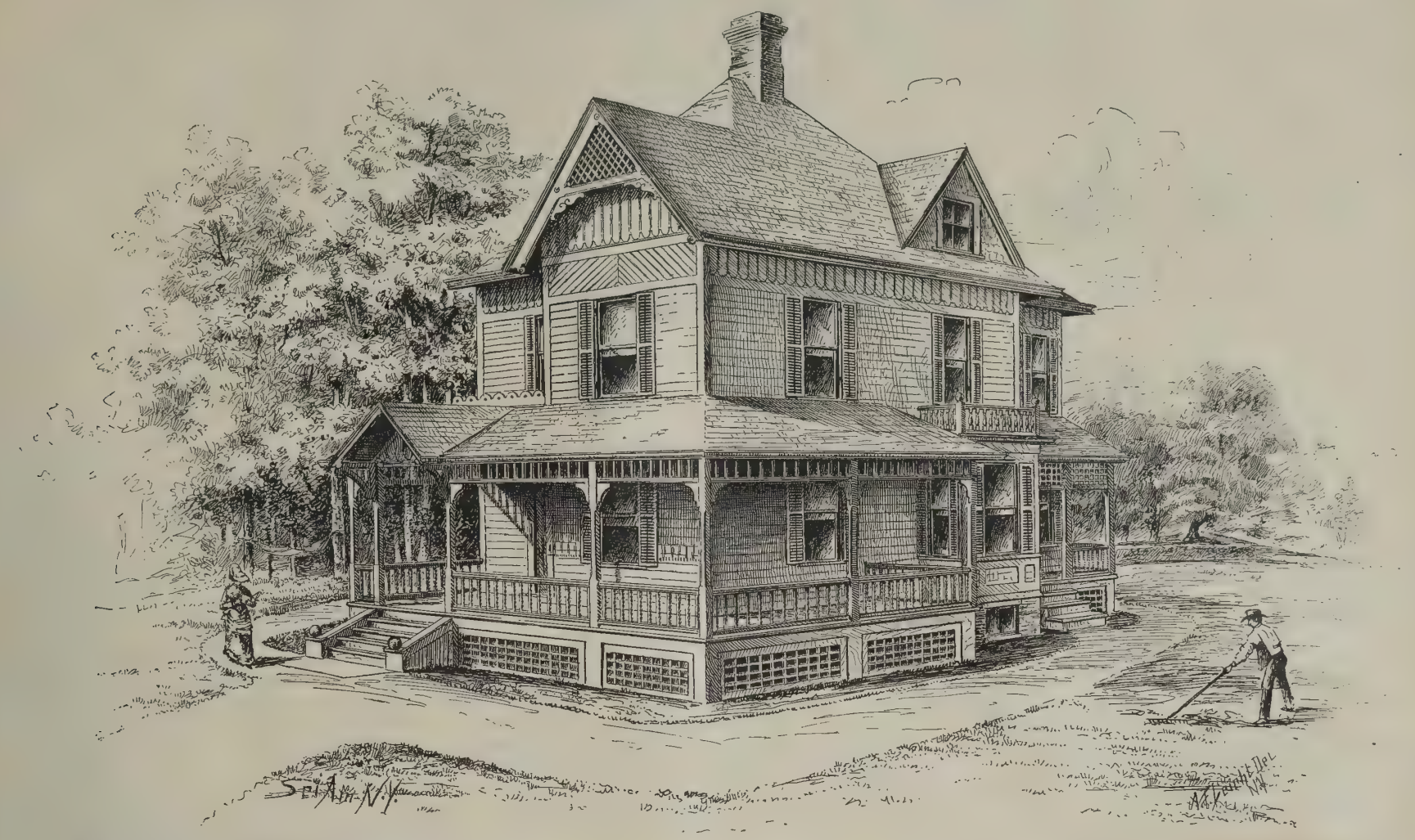
Size.—Front, 25 feet, exclusive of porch and bay windows; side, 47 feet, exclusive of porch. For size of rooms, see floor plans.

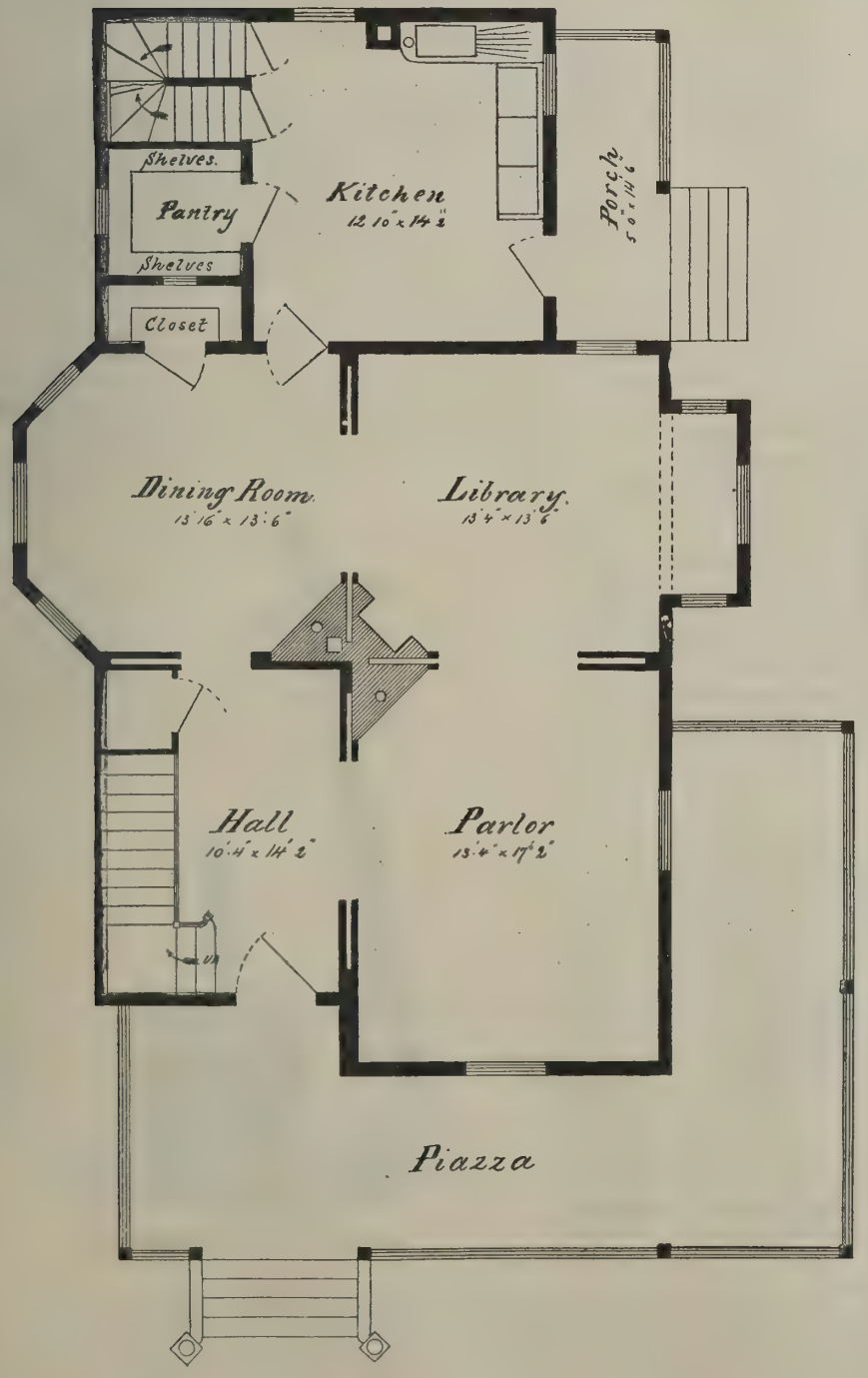
Height of Stories.—First story, 10 feet; second story, 9 feet 6 inches; attic story, 8 feet.

Materials.—Foundation, stone walls and brick piers; first and second stories, clapboarded; above second story windows, curtain boards with battens; gables finished in curtain boards and ornamental lattice. The entire third floor will be floored over, and three rooms can be finished thereon, if necessary.

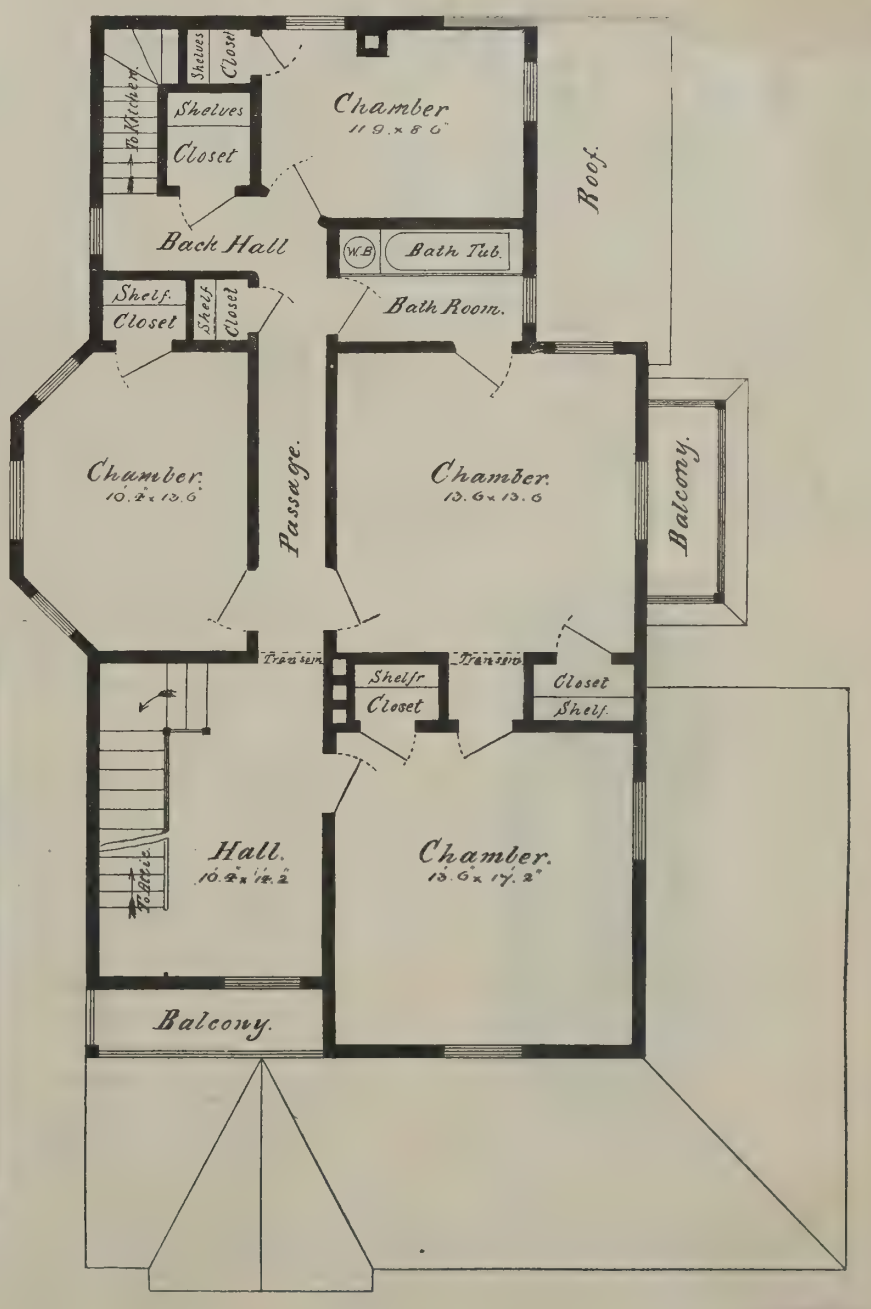
Cost.—$4,500, including plumbing, furnace, and everything complete.

Special Features.—Sliding doors connect the dining room, library, parlor, and hall. The chimney being in the corners of the dining room, parlor, and library, there is a fireplace in the library and place for stove in the dining room, if necessary. There are numerous and large closets throughout the house.





First Floor Plan.



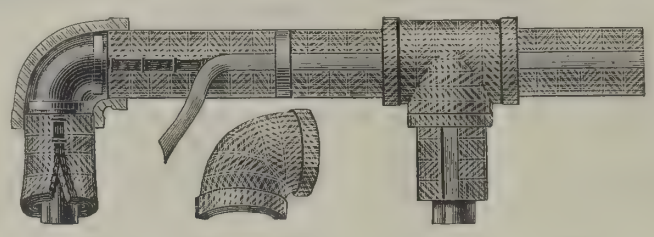
Second Floor Plan.

A $4,500 RESIDENCE.

INSULATED AIR COVERINGS FOR STEAM, WATER, AND GAS PIPES.

The engineer of the present day can no longer afford to leave metallic pipes used for steam conveyance exposed to the atmosphere. The engineering of the day is largely concerned in economy. The generation of steam has been brought to a comparative perfection. The boiler cannot be expected to do much better work than it now executes. But the steam engineer who contents himself with a high boiler performance neglects the most important source of waste. We refer to condensation in the pipes. An uncovered pipe is an atmospheric condenser. As fast as steam is delivered into and passes through it, condensation, with reduction in temperature and pressure, begins. The good qualities of any boiler can be completely neutralized by unprotected delivery pipes for the steam.

We illustrate here the sectional insulated air covering for pipes, as manufactured by Messrs. Shields & Brown Co., of 143 Worth St., in this city. The covering is composed of alternate layers of asbestos sheathing and corrugated and plain soft wool felting. The layers of felt are sewed together with a tape running in and out through the whole thickness. The tape is saturated with paste, and thus not only sews, but pastes them together firmly. The paste is allowed to dry, when a longitudinal cut is made through the center of this cemented slip. The effect of the combination is obvious. A porous structure full of air cells, the best non-conducting combination practical, is thus secured.



SECTIONAL INSULATED AIR COVERING FOR PIPES.

The covering is made up in three-foot sections, each forming a hollow cylinder, split or cut longitudinally. The consistence is such that it can be sawed as desired with a fine-toothed saw. Its durability is insured by the large proportion of asbestos contained. With the covering the makers supply staples and strips and bands of wool felt. To put it on the pipes it is sprung over them, the edges are drawn closely together by hand, or by a strap or rope. Staples are then driven in across the seams to secure them. After a few hours' standing to allow of any shrinkage, the edges are driven together and a strip is pasted over the seam. Bands are pasted around the joints between the sections.

Elbow, tee, and globe valve coverings are supplied also. Nothing can be neater in appearance than pipe thus covered, while the non-conducting qualities are unsurpassed. For putting it on, no tools are required except a hammer, a fine-toothed saw, a sharp knife, some thick flour paste, and paste brush. Any workman of ordinary ability, with, if necessary, a little "looking after," can apply it successfully. When applying to steam pipes, it is better to have the heat on, so that all shrinkage and conformation to the shape of the pipe may take place at once.

While our main reference has been to steam pipes, it should be remembered that the same qualities which make this so excellent a cover for them render it also an efficient protector for water or gas pipes, to prevent them from closing by the cold produced by frost. No greater annoyance than that produced by such occurrences exists, and in using such a covering as we describe, householders and others can save themselves much trouble.

The firm's Western address is 78 and 80 Lake Street, Chicago.

THE NEW ERA RADIATOR.

We illustrate in the cut a recently invented radiator which will, we are sure, be of peculiar interest to our readers who are interested in building. No fact is better known or has been more often commented on than the great waste incidental to the present system of burning coal, where sometimes ninety per cent. of the heat goes up the chimney, the remaining ten per cent., in the form of radiant heat, giving the room all the benefit it receives from the uneconomical arrangement.

THE NEW ERA RADIATOR.

Various efforts have been made to save this great waste, and various measures of success have been accorded them.

In the New Era radiator, an intelligently devised arrangement for this purpose is presented. A compact combination of drums and flues, it is made to take the place of a section of stove pipe. The heads are of cast iron, the rest of heavy sheet iron. Its weight is between thirty and thirty-five pounds. The smoke and hot gases from the fire enter the lower drum, pass up the annular smoke flues to the upper drum, and then escape. On passing through these annular flues, the gases are deprived of their intense heat. It is imparted to the metal of the radiator. This has a number of air pipes running from top to bottom. These heat the air, which pours into their lower openings comparatively cold and out of their upper ends warm and agreeably heated. Thus the lower stratum of cold air that lies along the floor, and is the cause of so many colds, is made to circulate upward, and is heated.

It may be connected at any point in the line of the stove pipe. Thus a pipe may be carried through a ceiling, and the upper rooms heated by the radiator without any extra consumption of fuel whatever. By placing it on the stove pipe in the same room with the stove, the efficiency of the stove will be greatly increased.

The New Era radiator is as easy to clean as a stove pipe, has no horizontal obstructions to catch soot, is gas tight, and, while effecting the large saving in heat, does not injure the draught. It is stated that nearly fifty per cent. of the fuel burned can be saved by it.

It is manufactured only by the firm of Wilmot Castle & Co., 177 to 193 West Main Street, Rochester, N. Y.

Shingle Stains.

A prominent French paper on architecture speaks of the advancement in America over European countries in the effect of color on the outside of the country houses. It says the effect from the use of stained shingles gives a certain finish to the architecture of a house which cannot be given otherwise.

At first the use of poor stains for outside work discouraged the architects, as the stains washed off and faded out, but since the Dexters' English shingle stains have been used, it has given a new impetus to the whole profession. Cheap stains of a chemical nature, which claimed that dry rot could be avoided by their use, faded out from the contact of color, and the chemicals used and washed off, because the liquid base of this chemical stain was water, which is proved by the freezing of such stains in the winter months.

The Dexter English shingle stains are wholly of an oil nature, containing no "*dead oil*," and are colored by the use of pure English ground pigments.

They are now used by the best architects, and Dexter Brothers show testimonials of architects who have done the best and largest work in Newport, Bar Harbor, Lenox, Boston, New York, Philadelphia, and it is now being used throughout the entire West.

Rosenberg's Finishes.

E. H. Jemison, representing the United States Treasury Department, has written a letter "recommending the use by the department" of Rosenberg's Elastica Finishes. He says he found them to be "as represented in every respect," and "very superior in finish to those we are now using."

Effects of Snow on Marble.

The results of the examination of snow taken from different places in Munich and its neighborhood, by Mr. Sendtner, says the *Pharmaceutical Journal* (London), would seem to indicate not only that snow has a considerable faculty for absorbing sulphurous acid from the atmosphere, but that the absorption goes on continuously for some time. Mr. Sendtner ascertained that on one day when snow fell, sulphurous and sulphuric acids were present in it in fairly equal portions, but on the second day almost all the sulphurous acid had been ozonized to sulphuric acid. In the vicinity of chimneys and gas works the absorption would, of course, be greater. This great absorptive power toward sulphurous and sulphuric acids is considered of practical interest, as explaining the destructive influence of snow upon marble.

THE "ALERT" DOUBLE ACTING HAND FORCE PUMP.

For house use in country neighborhoods a hand pump, easily repaired, with valves readily accessible and with silent action, has long been a desideratum. In the pump we illustrate, made by The Goulds Mfg. Co., of 60 Barclay St., New York City, these points are all attained. The pumps are built at the extensive factory of the company at Seneca Falls, N. Y.

The direct acting lever and piston rod have been adopted in place of the old-fashioned rock shaft. This leaves only one stuffing box to be packed instead of two. On each side of the pump are two openings threaded with iron pipe thread. These are the suction and discharge openings. The object in having them on both sides is obvious. It permits almost any connections from cistern or well and to the tanks to be adopted.

To insure quiet working and save jarring the pipes, which is a frequent cause of leakage and of loosening the joints, an air chamber is placed on the upper side of the valve chest. This cushions the water so that a comparatively even stream is delivered into the house pipes.

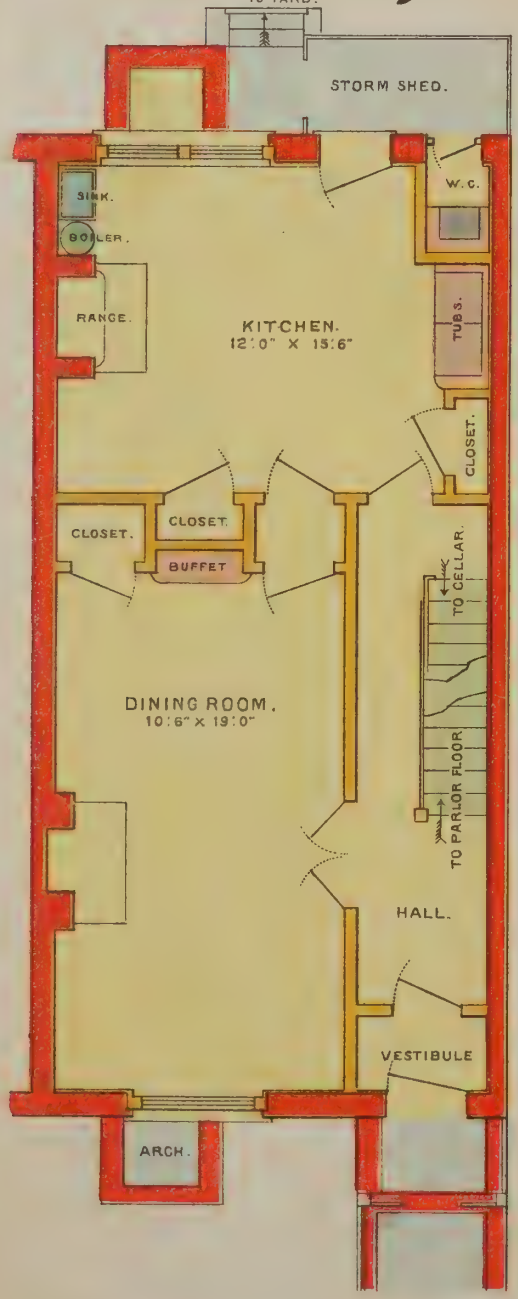
On top of the air chamber is a heavy brass nut. This, when unscrewed, permits the whole pump to be taken apart. At once the valves, both inlet and outlet, are exposed on removal of the air chamber and cover of the valve chest. In this operation the suction and delivery pipe connections are undisturbed. This point is of no little importance, for once such joints are made, it is of the last importance to leave them undisturbed.

The pump is very light and small. It occupies a floor space of only eight by twenty inches, and can pump against any pressure up to 100 lb. per square inch. It is in general built on the lines of a steam pump. In their specifications for country residences it is the style now prescribed by architects. Several reasons besides those detailed make it the best for this purpose. Thus by its double discharge it may be arranged to pump either into a tank from one side or directly from a faucet connected to the other. This provides for a fresh supply for the culinary wants, while the main water system is kept supplied from one or more tanks fed from the other side.

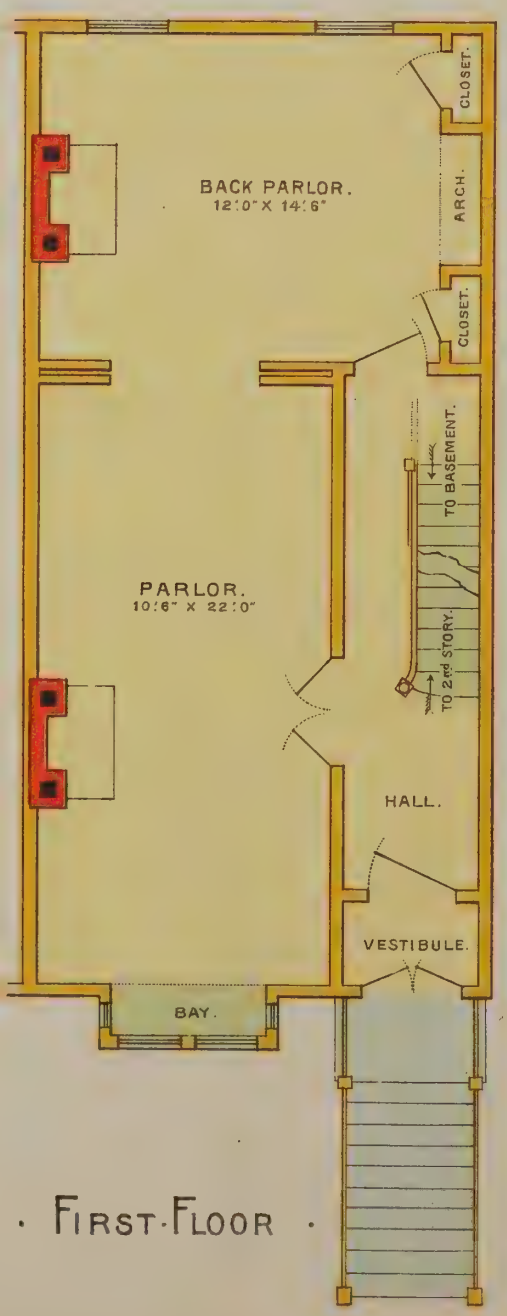
"ALERT" HAND FORCE PUMP.

City Frame Houses of Moderate Cost.

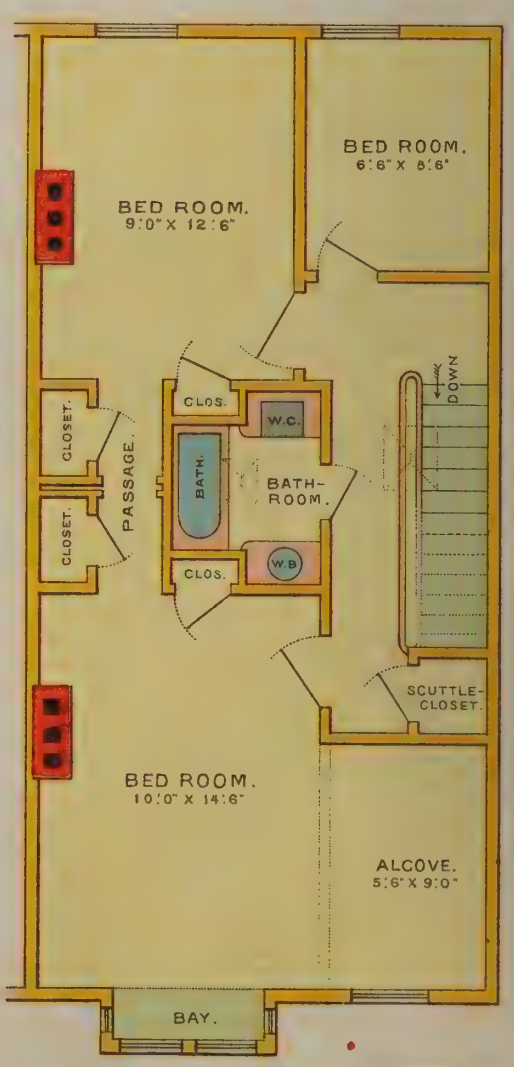
TO YARD.



· BASEMENT ·

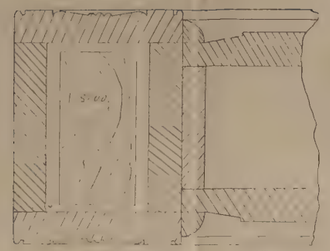


· FIRST-FLOOR ·

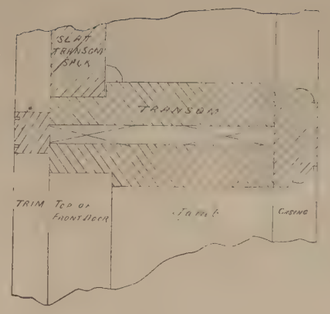


· SECOND-FLOOR ·

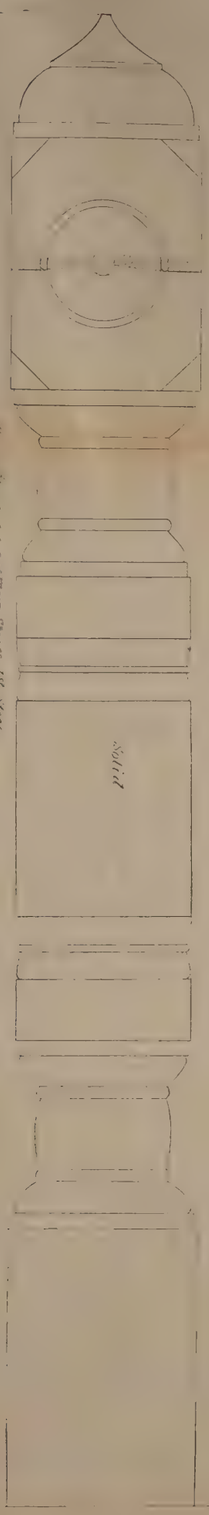
South Elevation

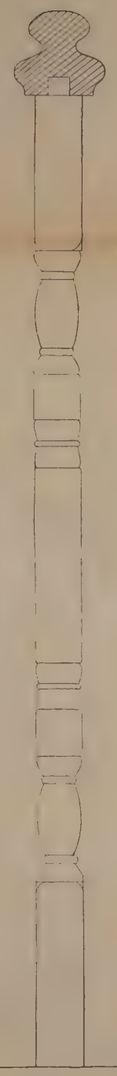


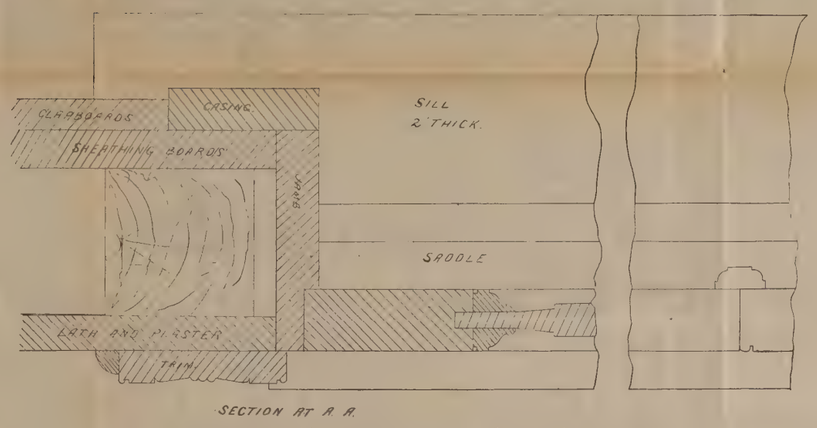
FULL SIZE OF THE SPINDLE WORK



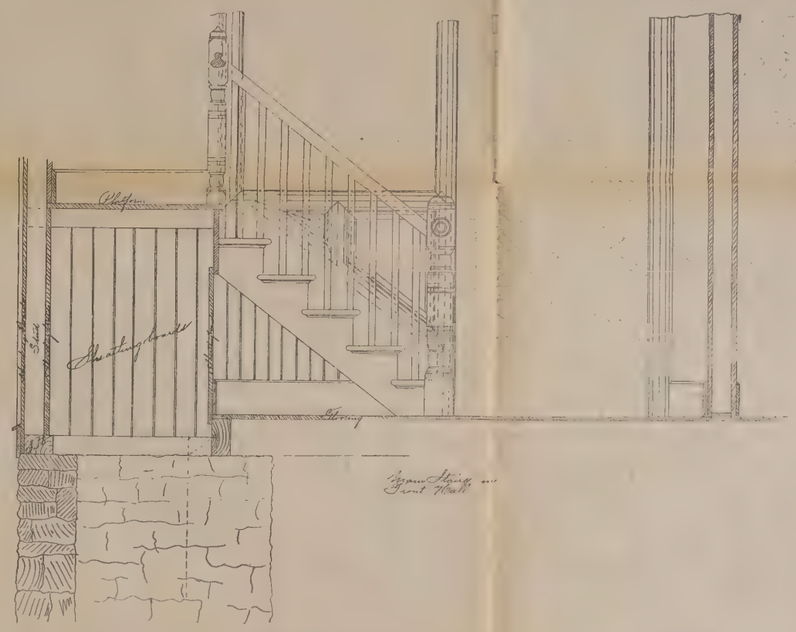
Rear Elevation

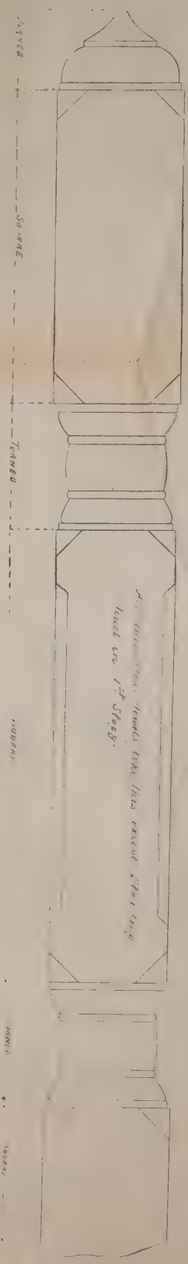




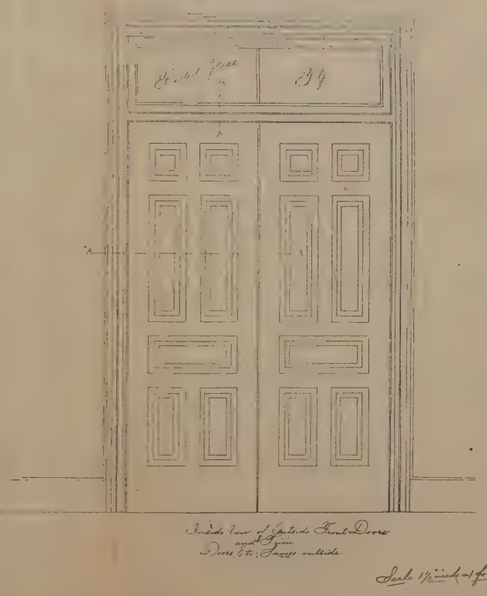


SECTION AT A A.





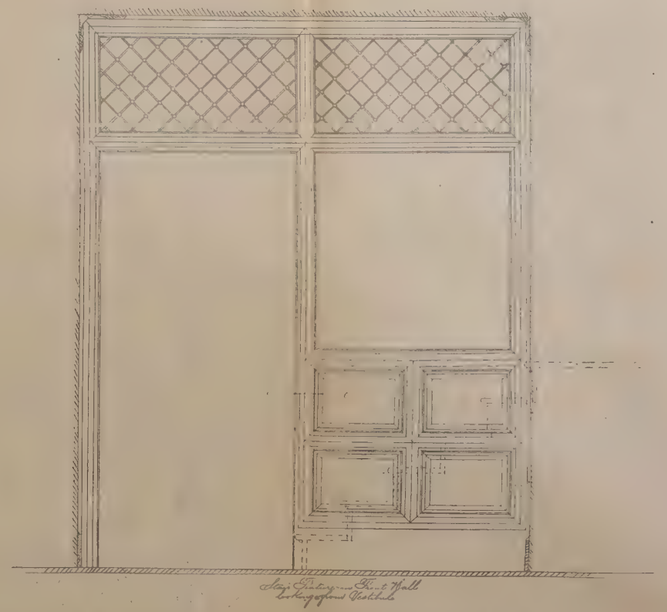
A Dwelling for $2,500.



Inside View of Outside Front Doors and Frame Doors, &c., Seen outside.

Sash Window-Sash

Front Vestibule Doors Seen Looking East in Direction of Front Doors

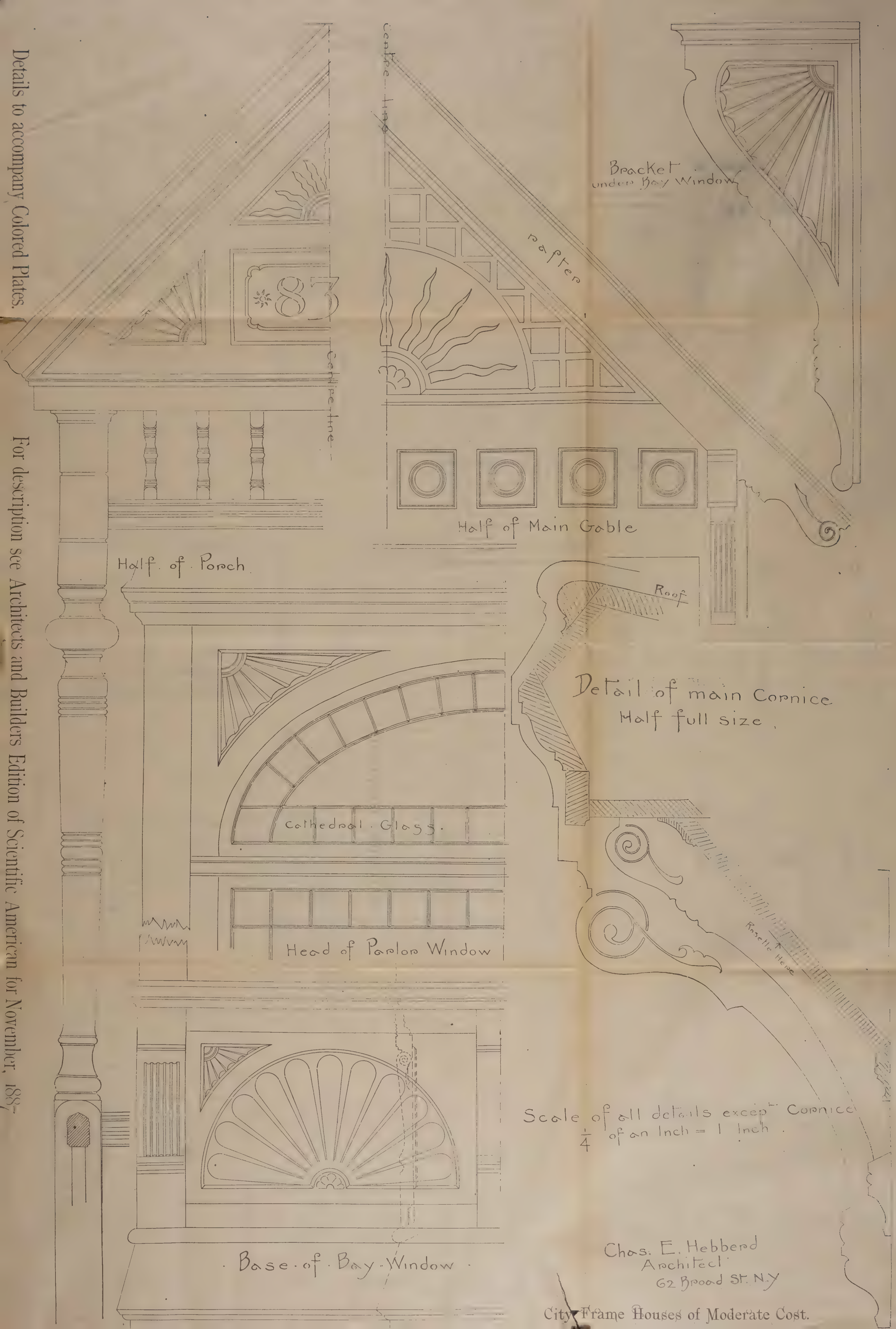


Stair Gateway in Front Hall Looking North

Details to accompany Colored Plates. For description see Architects and Builders Edition of Scientific American for November, 1887

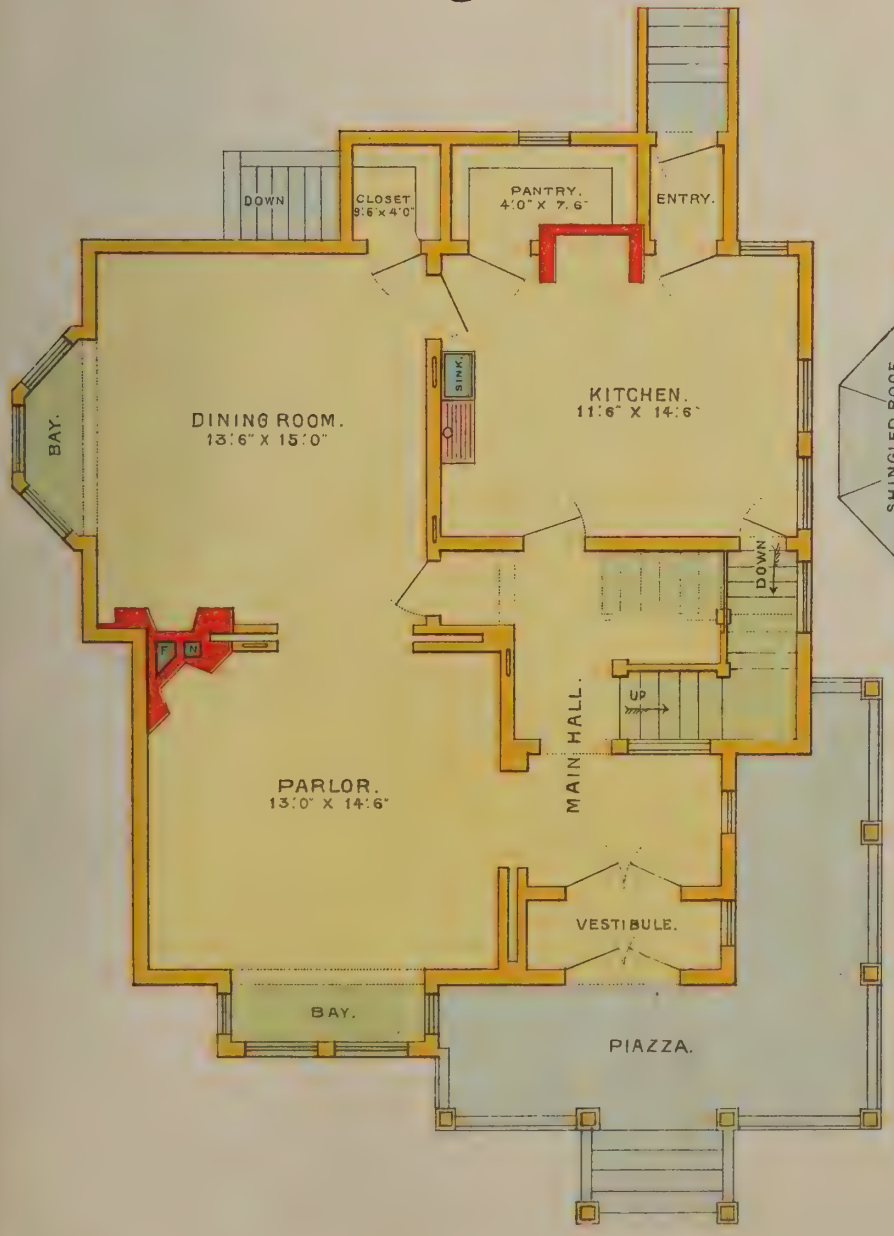
Details to accompany Colored Plates.

For description see Architects and Builders Edition of Scientific American for November, 188-

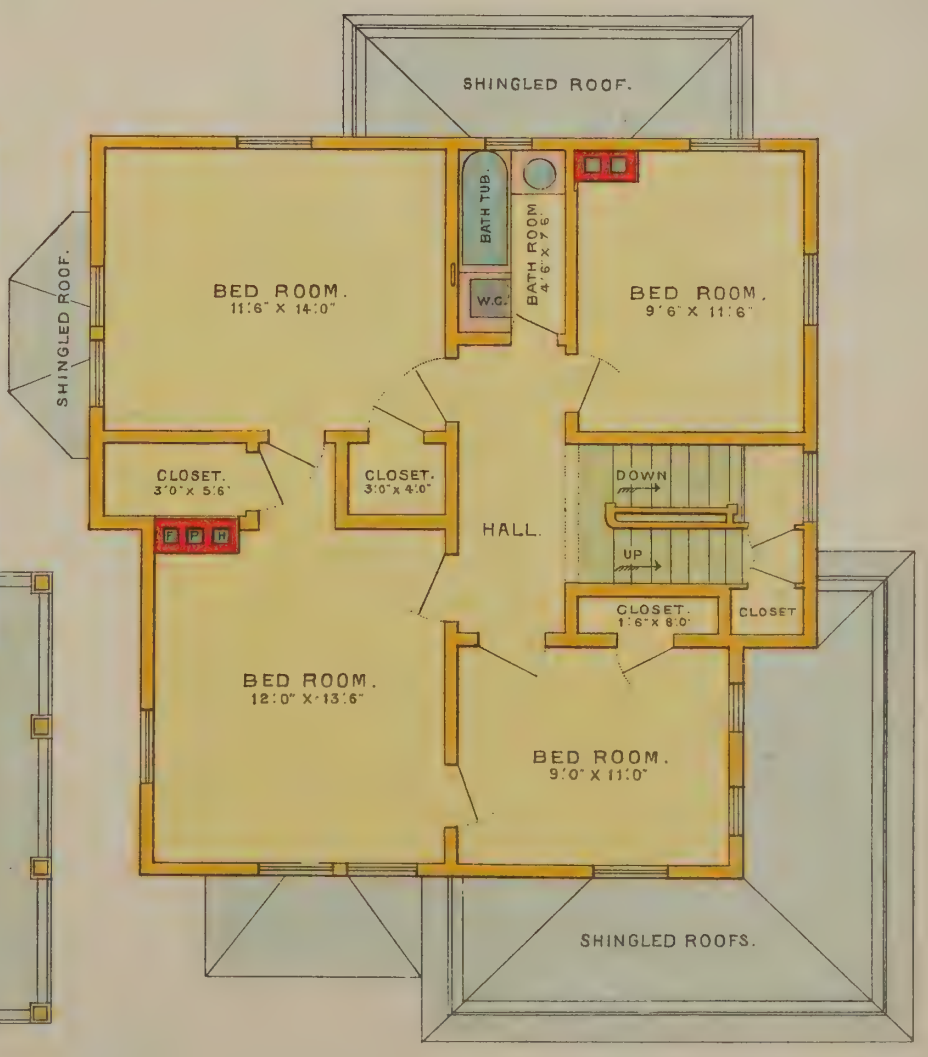


City Frame Houses of Moderate Cost.

A Dwelling for ~~Five~~ Two Thousand Five Hundred Dollars.



Plan of First Floor.



Plan of Second Floor.

SCHUMACHER & ETTLINGER, NEW YORK.

SCIENTIFIC AMERICAN

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ARCHITECTS AND BUILDERS EDITION.

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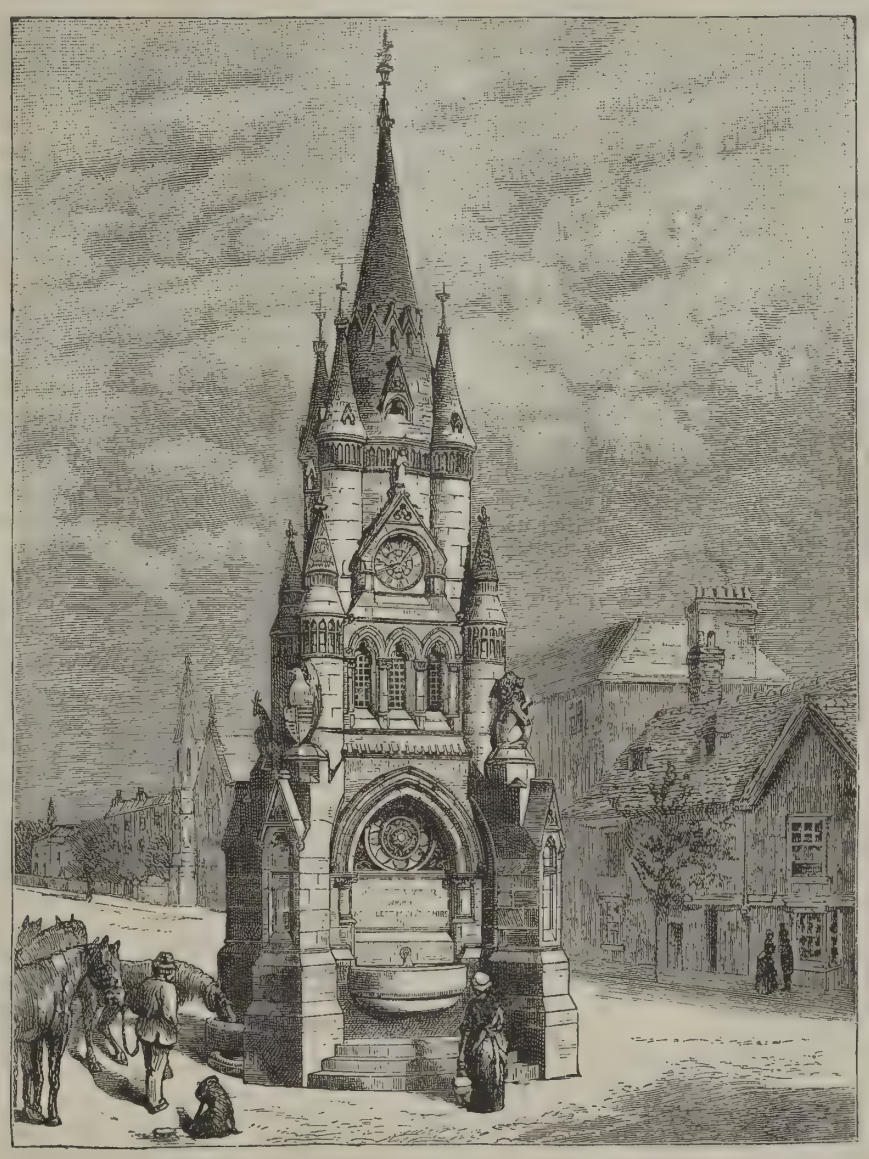
THE SHAKESPEARE MEMORIAL AT STRATFORD-UPON-AVON.

The American veneration for the birthplace of Shakespeare is well known, and it has just taken practical shape by the presentation to the town of a public drinking fountain and clock tower, the gift of an American citizen, Mr. George W. Childs, of Philadelphia, in commemoration of the jubilee of Queen Victoria. The memorial has been erected in Rother Street, a broad open space near the center of the town, where several thoroughfares converge, and where the annual statute fairs or "mops" take place. The structure is handsome and imposing, and is built of Peterhead granite (for the fountain) and of hard freestone (for the clock tower). The base of the tower is square, with projecting buttresses at the four corners, terminating in acutely pointed gablets, surmounted by a lion bearing the arms of Great Britain alternately with the American eagle and the stars and stripes. Appropriate inscriptions are engraved on the four sides of the memorial. The tower terminates in a spire, beneath and surrounding which are smaller spires and turrets. The whole height of the structure is fifty feet. The architect is Mr. Jethro A. Cossins, of Birmingham. The ceremony of inaugurating the fountain was performed on Monday, October 17, by Mr. Henry Irving, in the presence of the Mayor (Sir Arthur Hodgson, K.C. M G.), the corporation, and a distinguished company of visitors. Sympathetic letters were read from Mr. J. Russell Lowell and Mr. Whittier; and speeches were delivered by Mr. Irving, by Mr. Phelps, the American Minister, Mr. Walter, of the *Times*, Sir Theodore Martin, and others.—*London Graphic.*



THE SHAKESPEARE MEMORIAL AT STRATFORD-UPON-AVON.

Optical Refinements in Architecture.

Many architects look upon all refinements of line and curve as so much waste time, and would as soon think of referring to the original Latin of Vitruvius for rules in proportioning their rooms as to consult and apply the corrections of the Parthenon to their buildings. In sketching out his design to a small scale on a sheet of Whatman's drawing paper, the architect does so without any further thought than to produce a convenient plan or a well grouped elevation. Any infinitesimal correction to the straight line or entasis would be inappreciable to the naked eye on the surface of paper the inequalities of which would render it worthless; nor does he take much trouble in the proportions of his rooms, so long as they look right and fit well. If such refinements are to be made, they should be shown in large drawings, or set out to the full size on the works by proper rules and other instruments. The task is laborious and troublesome, and contract prices are little in sympathy with such niceties of adjustment. Even of the more practicable mode of adopting certain ratios and proportions, the architect does not avail himself very much.

We do not say that every horizontal beam—such as an entablature supported by columns at intervals—ought to be "corrected" by the application of a parabolic curve, or that every string course and cornice should be arranged to curve or bend upward; but we contend that these refinements ought to be made in interiors wherever the lines are long, and contrasting lines and surfaces occur in juxtaposition; that they are, in truth, applying precisely the same principle of correction as the colorist or decorator would apply when he takes care to juxtapose two colors or shades which shall be complementary to or harmonize with each other.

It is painful to witness in modern buildings a perfect ignoring of these principles of design. We go into a public hall or concert room, and take our seat. The flat coffered ceiling appears to be literally bending or falling upon our heads. To make the impression still more apparent, the architect has introduced a circular or flatly curved arch over the orchestral recess. If the ceiling is a flat curve, as it often is, the trusses are, perhaps, brought down below and incased, their lower edges being made perfectly horizontal, the two lines serving to increase the difference between them; in other words, to make the trusses look as if they were deflecting.

Mr. Pennethorne, some years ago, showed that the masses of the temples of Athens and Rome were designed on perspective principles—that is to say, the masses and many of the details were designed as they were intended to be viewed. The point of sight was always before the architect—that is to say, he studied the effect of his entablatures, abaci, and other masses of details from points of view that were likely to be frequented. It is well known that the various sections through the Doric capitals, the mouldings, and other parts of Athenian buildings, were composed of different arcs of the conic sections. Mr. Pennethorne says that the Greek entablature is perspectively proportioned and arranged to suit the given points of sight thus: The apparent height of entablature is measured in seconds upon the arc of a great circle. "Then, dividing this whole apparent height into some given number of aliquot parts, measured also in seconds, the apparent height of the architrave, of the frieze, and cornice will, in each case, be a multiple of this given modulus. Again, by dividing the first modulus into a given number of apparent aliquot parts, a second modulus is obtained, by which the apparent heights of all the details of the cornice of architrave and frieze will be regulated, and the true lineal heights are then all determined by trigonometrical calculations." In short, all the visible heights of features are, upon this principle, regulated from a given point, the real elevational height of each part being afterward found.

This system of proportion would probably entail too much labor upon the architect to work out with any accuracy, and may be looked upon as chimerical. But we see instances every day of positive ignorance of these principles, especially in the designing of mouldings, projecting features, and towers. If the architect is too impatient to make nice corrections in the manner we have pointed out, he ought at least to take the trouble necessary to regulate his heights and masses before inking in his elevations. Sketching in perspective is a valuable auxiliary in designing roughly the masses of a building; but some more accurate method is required in perspectively setting out the heights of stories, entablatures, parapets, towers, and other features. This can only be done by adjusting all heights from a given point of sight, or upon the arc of a circle described from the said point. An elevation is misleading, as every architect knows who has suffered disappointment after the building is finished. It only gives vertical heights, which may be very much curtailed or foreshortened in the actual view of the building from the opposite side of the street, for example.

Many towers and spires have been spoiled by designing them in elevation instead of at the angle. In broach spires we find a want of care in one particular above the others. The broach is designed on the level. The hips of the broach are made to look gentle in elevation, but when raised above the eye 60 or 100 feet, they become so depressed as to give a very ungraceful and abrupt springing to the spire.

We may instance the want of entasis to spires and columns. Every one who has a critical sense of vision must have observed the apparent weakness there is in a spire that has perfectly straight sides, when compared with one which has been entasised, and the same with all columns. Here also the method to insure the correction can be easily applied. The more important of these refinements are capable of being made at the initial stage of design, without recourse to decimals of two or three removes from the decimal point, or to mathematical calculations.—*Abstract from the Building News.*

Testing Pile-Protecting Compounds.

In 1882 several piles, coated with various patent anti-teredo coverings, were driven in the harbor of San Francisco for the purpose of testing them. Recently Engineer Manson began pulling up the piles in order to see the result of the experiments. A pile coated with Pearce's compound, composed of paraffine, limestone, kaolin, etc., was found to be completely honeycombed by the teredos. The eucalyptus and cedar piles were also nearly destroyed. In 1884 the two piles incased by A. W. Von Schmidt in sewer pipe and cement, the twenty-three coated by Frank Shay with asphalt and wire cloth, the ten of McKeon & Co., coated with warm cement containing a poisonous substance, and those of W. H. Hayes, coated with Portland cement, etc., were examined by Colonel Mendel and Mr. Manson. All showed signs of having proved failures. The insect is ahead of the inventors up to date.

A Tower on the Mount of Olives.

The tower which is being erected by the Russians on the highest point of the Mount of Olives is already several stories high, but one more is to be added. The object is to make it so high that both the Mediterranean and the Dead Sea may be seen from the top. A number of bells will be placed in the tower. In digging the foundation, several Christian graves were found, together with an inscription in Greek, in which the word "Stephanus" could yet be deciphered.

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NEW YORK, DECEMBER, 1887.

THE

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ARCHITECTS AND BUILDERS EDITION.

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CONTENTS

Of the December number of the ARCHITECTS AND BUILDERS EDITION of SCIENTIFIC AMERICAN.

(Illustrated articles are marked with an asterisk.)

TO OUR READERS AND PATRONS.

The present number closes our fourth volume and brings us to the end of another year. Many subscriptions now terminate, and we ask our patrons to be prompt in sending their renewals, thus avoiding the loss of any numbers. The terms are only $2.50 a year.

Considering the wealth of illustration, the variety and value of information presented, this work is by far the cheapest of anything in the same line.

To builders, and those contemplating the erection of dwellings or other structures, our paper has proved to be of great value.

With every number, during the past two years, we have given plates in colors of many new buildings, with specifications, accompanied by extra special sheets of details. In most cases these have been so complete as to enable the builder and contractor to proceed at once with the construction; and on the plans thus presented, thousands of new buildings have been erected in all parts of the country. In almost every town in the land attractive dwellings are now to be seen, which, on inquiry, will be found to have been built from SCIENTIFIC AMERICAN plans.

No architectural publication in the world presents to its patrons so many practical specifications and drawings without cost, except the merely nominal subscription rate of $2.50 a year. It is hardly necessary to remind the builder that he would be obliged to pay several hundred dollars if the same number of plans were to be specially prepared for him.

In addition to the colored plates, details, and specifications, we have furnished a large number of other new architectural illustrations and many pages of valuable information. In all, the past year's volumes include about one thousand engravings.

We remind our readers of these items with the hope they will mention them to their friends, and, if possible to secure a new subscription, to send it in with the renewal of their own.

Our aim is to improve and enlarge the sphere of work, rendering it more and more valuable. To this end we need the support and encouragement of as many subscribers as possible. If each one of our friends will do a little for us in this direction, all the parties concerned will derive benefit.

If any of readers have inquiries to be answered, or suggestions to make, relating to subjects or features they would like to see treated in our paper, we shall, at all times, be pleased to hear from them.

Architects and builders who desire to see their plans reproduced in our pages are also invited to communicate with the editor.

A CORRECTION.

In our November number an error was made in the estimate given for the $2,500 house illustrated in our colored plate. The cost should have been stated at $3,400. In some way the bill for mason work and painting was omitted. These additions and other modifications bring the cost up to the above sum.

A SUBURBAN RESIDENCE.

One of our colored plates this month represents a suburban dwelling built of dark trap rock, trimmed with buff brick, and roofed with ornamental stamped iron plates. It is now being constructed in New Jersey, by days' work, at a cost of about $9,250. The following is an abstract from the

SPECIFICATIONS.

MASON WORK.

Excavating.—Excavation under the entire house to a depth of about 4'.

Cellar Walls.—Cellar walls built of good sized trap rock. All necessary bluestone sills, cellar steps, and copings, fine tooled brownstone steps for stoops, also fine tooled brownstone sills for the doors and windows above cellar.

Walls.—All stone walls above cellar are medium sized trap rock and well selected, pointed with black mortar.

Brick Trimmings.—Buff brick used for trimmings, as shown on the plans, laid in mortar same color as brick.

Chimneys.—Chimneys built of trap rock and buff brick, and topped out as shown on the plans.

Fireplaces —Fireplaces built where shown, of white fire brick, and the hearths laid in tile.

Stone Steps.—Stone steps from main entrance to ground.

Porch Floor.—Porch floor is cemented with Portland cement.

Cementing.—The entire cellar bottom is cemented 3" thick with concrete and Portland cement.

Plastering—The entire first and second stories are plastered three-coat work, hard finished. Cornices in principal part of first story and second story hall. Center pieces in rooms to correspond.

CARPENTRY.

Timber.—Timber all well seasoned spruce. Floor timbers, 2×10", 12' on centers. Studding, 3"×4". Main rafters. 2"×8", 24" on center.

Cornice.—The cornice is formed of wood heavily moulded,

Roof.—The rafters are covered with hemlock boards, then covered with ornamental iron plates laid on tar felt. Valleys and gutters, XX tin. Leaders, galvanized iron. The ridge is ornamental iron work.

Floors.—The floors throughout are double. The upper floors are narrow white pine, except hall and kitchen. The hall is narrow oak, the kitchen narrow white maple, the bath rooms are white maple. The main hall is paneled wainscot, 4' high. Kitchen and bath rooms wainscoted with narrow beaded strips of maple. The trimmings throughout, except main hall, will be selected white pine. Hall to be of white oak. Doors to be six paneled. Main stairs and balustrade to be white oak. Others stairs white pine, with Georgia pine treads. Inside blinds throughout. Plain bronze hardware on principal part of first story. Jet and bronze for balance.

Painting.—The wood and iron work on the outside will be painted three coats. The inside will be wood filled and have two coats of hard oil.

Plumbing.—The apparatus for plumbing work located as shown on the plans. To be piped and arranged for water pressure.

Range.—The kitchen to have an approved low down range, fitted in fireplace.

Heater.—There will be placed in the cellar a No. 14 combination steam and hot air heater.

ESTIMATE OF COST.

Mason work, complete	$4,400
Carpenter and roof work	3,400
Painting	200
Plumbing, gas pipes, etc	650
Steam heating	600
	$9,250

A LARGE CONTRACT FOR ROOFING PLATE.

The interesting picture of the Western Tennessee Hospital for the Insane, at Bolivar, in that State, which will be found in our advertising pages, will command the attention of humanitarians and administrators everywhere. Such buildings, devoted to such purposes, are not frequently to be met with. The announcement made in connection therewith, that the Alderly brand of square Terne plate was selected by the commissioners for the roof, gutters, and valleys of the structure, requiring over 1,000 boxes of roofing plate, presents, in a forcible way, the claims of that article. It is manufactured and sold by Messrs. Gummey, Spering, Ingram & Co., of Philadelphia, Pa., and Liverpool, England.

A DWELLING OF MODERATE COST.

This cottage is built in Plymouth Park, Buzzard's Bay, near Wareham, Mass., one of the most charming locations on the New England coast. From the veranda a beautiful view is obtained of the bay and coast. The cottage is erected on one of the knolls (which is one of the features of the park), and has for a background a grove of pine and oak trees. The shingles are treated with "Cabot's creosote stains" of the following colors: On roofs, a steel gray, and on sides, sienna. The clapboards are painted a light olive green and trimmed with bronze green and Indian red. The studs of hall, dining room, and parlor are exposed, and together with underboarding and beams overhead are planed and sandpapered, and all woodwork is given two coats of shellac of light finish. The second floor is plastered (sand finish). The contract price for cottage was $2,800 complete. The architect is Chas. E. Miller, 149 Broadway, N. Y.

SPECIFICATION.

GENERAL CONDITIONS.

The contractor is to give his personal superintenddence to the work, and to furnish all transportation, labor, materials, apparatus, scaffolding, and utensils needful for performing the work in the best workmanlike manner, according to the true intent and meaning of the drawings and these specifications, which are intended to be co-operative, and when anything is shown on plans and not mentioned in specification, or *vice versa*, the same is to be furnished as though it were both shown and specified. This specification and the drawings annexed are intended to include everything requisite to the proper and entire finishing of carpenter's, mason's, and plumber's work, and the same shall be furnished, notwithstanding every item necessarily involved in the above words is not particularly mentioned.

All work when finished is to be delivered up in an undamaged state, without exception, except where otherwise specified, all materials to be of their respective kinds, and all labor to be done in the best workmanlike manner, to the full satisfaction of owner. Should the contractor introduce, at any time, materials different from the sort and quality herein specified, the same shall be removed and made good at the contractor's expense.

The contractor will be held responsible for all portions of the work let to him.

The contractor shall make no alterations of the drawings or specification, but should any error or inconsistency appear in these, it shall be the duty of the con

tractor to duly notify architect, who will make proper adjustment. The contractor is to give to the proper authorities all requisite notices of the work in his charge, obtain official permits and licenses for temporary obstructions and pay all proper fees for the same, and to be solely answerable for all damage to neighboring premises or to the person or property of the public by himself or his men or through any operatives under his charge, whether in contract or extra work. Contractor is to protect his work from frost until building is finished, and is to cart away all rubbish and leave the whole broom cleam. All drawings, etc., are to be returned to the architect, and are not to be used for any other building.

CARPENTER.

Scantling.—Sills over piers 6″×8″, sills that rest on stone wall 4″×6″, all to be halved and pinned at angles. Plates 4″×4″, posts 4″×6″, girts 4″×4″, braces 2″×4″, studding 2″×4″. The studding of hall, parlor, and dining room to be planed and chamfered.

Partition caps 2″×4′ to be planned in the above rooms. Soles 2″×4″ as well. First floor beams 2″×8″, 16″ on centers. Second floor 2″×8″, 16″ on centers, and to be dressed when exposed in above rooms. Attic beams 2″×8″, 16″ on centers. All beams under partitions to be doubled and spiked. Trimmers ditto.

Main Roof.—Rafters 2″×8″, 2′ on centers. Valley rafters 3″×10″.

Veranda.—Girders 4″×8″, floor beams 2″×6″, 2′ on centers. Rafters 2″×6″ (dressed). Posts constructed of studs. Hemlock boards and shingles. Veranda roof timber will be exposed and dressed, floor to be merchantable yellow pine, free from large loose knots, shakes, or sap. Balcony floors to be covered with heavy canvas and slushed over with matallic paint, to be graded away from wall of house.

Framing.—The house to be framed and braced in a perfect and substantial manner, and to be perfectly plumb and true. All beams to be spiked together where practicable, so as to form tie across building. All framing of beams to be with tenon and tusk. Roofs strongly framed and cross bridges, first and third tier of beams. Gutters on roof to be hung of galvanized iron. Veranda to be built in and lined with Merchant & Company's roofing tin (or plates). There will be three 4″ galvanized iron leaders for main roof, and one in front for veranda. (See plans.)

Gables.—Construct gables as shown.

Roofing.—Cover all roofs with sawed pine shingles 6″ ×18″, three shingles to the lap. On main roofs these to be nailed on shingle laths ; on veranda roofs, on spruce boards, underside dressed (as specified). Flashing of Merchant & Company's old method roofing plates. Flash around chimney, valleys, and junction of roofs with walls of house.

Walls.—The walls of hall, dining room, and parlor to be covered with good ⅞″ pine boards dressed on exposed side ; all other underboarding to be of hemlock of even thickness. Over this cover walls with felt paper, and then on first story cover paper with clear pine clapboards 5″ to weather. Above felt cover paper with 6″ × 16″ sawed pine shingles not more than 6″ to weather. Between partitions of hall, dining room, and parlor fit ⅞″ pine boards, dressed on both sides, with ¼ round mould to keep panel in place ; the sheathing on other sides of room dressed on one side ; boards not more than 5″ wide.

Bases.—Form base as shown of 1½″ thick pine.

Casings.—1¼″ thick and 2″ wide.

Furring.—Fur out the walls of stairs to cellar (corner boards to be 4″ wide, 1¼″ thick ; put on angle beads where necessary).

Outside Step.—⅞″ thick riser, 1¼″ thick tread.

Flooring.—First and second floors to be made of good T. and G. yellow pine in rooms over hall, parlor, and dining room ; to be dressed on both sides ; third floor spruce ; all to be not more than 5″ wide.

Partitions.—Set the partitions between hall, parlor, dining room, pantry, kitchen, and cellar stairs with 2″×4″ spruce, studs dressed and chamfered. (*Note.*—This is to be done so as to make a uniform appearance in hall, dining room, and parlor.) Studs of all other partitions of hemlock. Construct woodwork between piers, as shown.

Interior Stock.—All the stock for inside finish to be best quality, well seasoned, smoothed, and sandpapered, and, unless otherwise specified, of white pine. Hardwood saddles for all hearths and door openings.

Architraves.—All doors and windows to have ⅞″×5″ plain architrave with moulding and bead on ends. No splicing allowed.

Doors.—Front door to be 2″ thick, of design shown (cherry). All other doors to have 1⅝″ thick four paneled stock door (local manufacture), and, unless otherwise shown, to be 2′ 6″×7′ 6″. The openings from hall to parlor and dining room to be : hall and parlor, 7′×7′ 6″; hall and dining room, 6′×7′ 6″. Bases 6″ high, moulded (in bed rooms, closets, and pantries).

Door Frames.—All door frames to have 1⅛″ thick jamb, with stops nailed on.

Window Frames.—All windows, unless otherwise shown, to have box frames with pockets ; sills to have sub-sill, upper sill, plowed, etc., and given proper pitch.

Sashes.—All sashes to be 1⅝″ thick, with lights as shown, and to have moulded sash bars. All sliding sashes to be double hung, the best steel axle pulleys, hemp sash cords, and iron weights. Cellar windows to have plank frame hinged at top. Casements to be hinged and have spring catches.

Bath Room.—Sheathe up sides of bath tub, riser of water closet and basin, with clear white pine ⅝″ thick ; wainscoating of bath room of same stuff 4′ 6″ high with neat mould on top. Make a batten door under basin with catch, etc. Door in riser of and in top of water closet and bath to be black walnut put on with brass screws.

Closets.—Fit up closets, except as otherwise specified, with one shelf, and cleat under for books. Bed room in attic to be furred as shown.

Dressers.—Fit up dresser in kitchen of clear white pine, glass doors at top and drawers and cupboards under ; dressers in pantry to be the same.

Blinds.—Provide and hang to all windows of first and second floors 1¼″ outside blinds of two folds properly hinged, and having rolling slats.

Base Knobs.—To all doors, and to have rubber tips.

Hardware.—Butts.—All doors to be properly hung with japanned butts of requisite sizes. Locks.—The front door to be supplied with brass faced mortise, patent reversible front door knob lock with night work, with two keys to each combination, and brass striking plate. All other doors (except closets) to have 4″ mortised locks, brass face and brass striking plate. Closets to have rim locks. All locks to have brass keys. Knobs.—The front door to have a plain 2½″ round bronze knob, with bronze rose and drop escutcheon to match. All other knobs to be (black) terra cotta with bronze iron mounting, etc. Bell pulls.—The bell pull to front door to be bronze, to match front door hardware. Bolts.—The rear door to kitchen to have two barrel bolts; door to cellar one, doors to bulkhead to have brass padlock with staples, etc. Drawer pulls.—Drawers to have bronzed iron drawer pulls. Sash fasts.—All double hung windows on first floor to have Morris patent self-locking sash fasts, to be of bronzed iron. Put on patent fasts to all casements, windows. Hooks.—Put heavy, triple hooks of japanned cast iron to all closets, 8″ apart. Screws.—All hinges, etc., to be securely put in place with steel screws of proper size. Bell hanging.—Put in a large gong for front door, properly connect with wire, etc.

Stairs.—Main stairs to have an open string moulded and nosing to return on ends and carried around well. Risers ⅞″ thick, tread 1½″ thick : tread and risers housed into wall string and treads plowed into risers ; risers plowed into the underside of the tread. The outer string to be 1″ thick, and beaded on lower edge. All to be of clear pine. The stairs to have cherry newel, 5″ × 5″, turned. Cherry rail, 2″ × 3″. Balusters, 3 on each tread, 1⅛ × 1⅛ ; all to be solidly put together and wedged. Cellar stairs to have 1½″ thick strings, sawed to receive 1¼ treads ; all of spruce. Attic stairs to have 1¼″ strings, plowed to receive risers and treads ; all of spruce.

PAINTING.

All shingles of walls and roof to be stained with Cabot's best creosote stains, of colors selected by architect. The clapboards to receive two coats of best white lead and linseed oil finish, in colors as directed.

Hardwood.—The newel, rail, and balusters to be filled with three coats of hard oil, rubbed to a dead finish. The studs and beams overhead in dining room, parlor, and hall to have two coats of shellac (or Wheeler's hard finish). All other woodwork the same.

Glazing.—All glass to be double thick American, of number of lights shown ; all to be well puttied and tacked, thoroughly cleaned, and left whole and perfect. All small lights to have cathedral glass, selected.

MASON.

Excavation.—Excavate for all cellar wall piers, etc., as shown. Dump the earth where directed, and leave the premises clear after building is finished. Piers 3′ below surface.

Cement, Lime, and Sand.—All lime used in the mason's work to be extra No. 1 Rockland lime. Cement, best quality Rosendale of approved brand. Sand to be clean and sharp, and all to be used in proper proportions.

Foundations.—Furnish all materials and build walls, unless otherwise shown, 1′ 6″ thick of stone laid in lime and cement mortar in equal portions, and clean, sharp sand in proper proportion ; the whole to be well bonded and trowel jointed inside and out.

Hearths.—Hearths to be of Portland cement, with lampblack to give color.

Bluestone.—Chimney cap to be of bluestone in one piece, holes for flues cut in. Cellar stairs as shown.

Brickwork.—Brickwork of chimney to be selected, on exposed places jointed in red mortar, all to be hard, well burned brick. Build in register flue in kitchen breast where directed and 6″ C. I. thimble where shown. Build in breast of chimney on second floor 5″ C. I. thimble, 2′ 6″ from floor.

Trimmer Arches.—Turn trimmer arches over all fireplace openings.

PLASTERER.

Laths.—Laths to be best seasoned pine, free from all imperfections, laid ⅜″ apart and breaking joint.

Plaster.—Plaster will be two coat work, the second to be white sand finish, well floated. The first coat to be best Rockland lime and clean sharp sand, well mixed with long cattle or goat hair, to be thoroughly worked and stacked, all to be well troweled and made perfectly true. Patch up and repair all plastering at completion of building.

PLUMBER.

Lead Pipes.—The lead pipes through to be AA lead pipe. The waste pipes to be heavy ; all joints between lead pipes to be heavily wiped, and joints between lead and iron pipes to be made with brass ferrules wiped into lead pipe and calked into iron pipe with molten lead and oakum.

Iron Pipes.—Iron pipes to be heavy C. I. soil pipe, free from all imperfections, and of uniform thickness ; thoroughly coated inside and out with coal tar. All joints to be calked tight with molten lead and oakum.

Drain Pipe.—From point marked on plans run a four inch C. I. pipe to roof, making all proper branches for water closets, baths, basins, tubs, sinks, and at roof to be capped with Smith's patent ventilating cap. At foot of this place a 4″ running trap, with hole for cleaning out, and an inlet to run out under servants' water closet. All branches to be Y branches, 4″ for water closet, and 2″ for basins, sink, etc. Plumber to make connections with street pipe.

Lead Supply Pipe.—Run from point marked on plans a ¾″ lead pipe. Place at the beginning of this a rough round way lever handle, stop and waste cock. Connect with main supply. From the ¾ [illegible] make all proper connections for water closets, tubs, baths, and sink with ⅝″ pipe, all to be graded empty at stock cock. In kitchen, over sink, put two cocks (lever handle), so as to control supply of hot and cold water to second floor, the same to empty in the sink.

Boiler.—Furnish and set where shown in kitchen a heavy 30 gallon galvanized iron boiler with stand complete. The boiler to be supplied with water through a branch of ⅝″ lead pipe, and connect with water tank of range with a ⅝″ extra strong lead pipe, the other part of boiler to be fitted up with ⅝″ strong lead pipe with ⅝″ sediment cock, and the required length of light lead pipe to empty into sink trap (boiler to have a safety attachment). Furnish and put on to supply to boiler in the most convenient place a ⅝″ finished lever handled stop cock to control supply to boiler. From head of boiler run lines of ⅝″ lead pipe to supply sink and tubs in kitchen, basin, and bath tub on second floor.

Sink.—Furnish and set up (and of size shown) a plain C. I. sink with slate back. To be set on C. I. legs, to be supplied with hot and cold water through ⅝″ lead pipe, drawn through ⅝″ compression bibb cocks, one hose, the other plain, wasted through heavy lead S trap calked into iron pipe as specified.

Tubs.—Furnish and set up tubs of size shown, supplied and wasted the same as sink, but to have brass plugs and safety chains. Tubs of wood well dovetailed.

Wash Basin.—Furnish and fit up (of size shown) in bath room a 1¼″ thick Italian marble slab, countersunk and moulded on edges, backs 10″ high, the slab to be fitted with a 12″ marble pattern basin (overflow) well fitted to slab, with brass clamps, etc. The basin to be supplied with hot and cold water through silver plated compression basin bibb cocks (⅝), wasted through 2″ lead pipe and S trap, silver plated basin plug and safety chain.

Bath.—Furnish and fit up bath of size shown, 14 ounce copper tinned and planished, tub to be supplied with hot and cold water through ⅝″ lead pipe, and drawn through ⅝″ bath silver plated compression cocks. Wasted through 2″ lead S trap. Silver plated plug and safety chain.

Note.—All lead S traps to have brass trap screws for cleaning.

Water Closet.—Water closet in bath to be a Demarest or Manhattan patent long oval flushing rim earthenware hopper, automatic seat, all complete, with waste preventing cistern, to be copper lined; supply through ⅝″ lead pipe connected to main supply ; to have heavy last lead trap, properly connected with soil pipe. Connect from cistern to hopper with 1¼ light lead pipe so as to get good flush. The water closet for servants to be enameled iron hopper with cistern, etc., as above.

IT is said that the ova of tapeworms are frequently deposited in the wrinkles of a lettuce leaf and near the mid rib of a cabbage leaf, and so it behooves those wishing uncooked leaves of any kind to have them carefully washed.

A FRENCH COTTAGE.

We publish herewith the plans for a house designed by M. A. Fatalot and erected by M. Valette, architect. It is built on the side of the terrace (Rue Babie), on the green hills which overlook the Seine.

The construction is very simple. The architect was, in fact, asked to use the strictest economy. The first floor, built over a cellar, consists simply of a vestibule, A, which opens into a dining room, C, a bed room, D, a kitchen, B, the water closets, E, and the stairway. The latter is constructed of wood and leads to the second story, which serves as both studio and drawing room. This room is lighted by the large window shown in our perspective view. The walls of the building are of stone—stone from Meudon, nicely colored—and Bourgogne bricks of different shades form the design of the frieze. The basement is of dressed stone; the pediments of the gables and the cornice are covered with a plaster of sand and mortar colored in imitation of stone. The tops of the pediments are decorated with Parvillee faience. The perron is of Bagneux stone and the mullions and supports of Euville stone.

The following is a detailed list of the expenses:

Masonry	$1,480
Carpenter work	265
Plumbing, etc	166
Joiner's work	462
Locksmith's work	315
Heater, etc	74
Painting and glazing	92
	$2,854
Salaries	200
	$3,054

A FRENCH COTTAGE—HOTEL DE PEINTRE, A MEUDON.

Our Forestry Problem.

According to latest estimates, we consume yearly, with our present population of sixty millions, not less than twenty billion cubic feet of wood. The amount is made up, in round figures, in the following manner:

2,500,000,000 feet for lumber market and wood manufactures;

360,000,000 feet for railroad construction;

250,000,000 feet for charcoal;

500,000,000 feet for fence material, etc.;

17,500,000,000 feet for fuel.

To this it will be safe to add, for wasteful practices and for the destruction by yearly conflagrations, at the least, twenty-five per cent.

The average yearly growth of wood per acre in the well stocked and well cared for forests of Germany has been computed at fifty cubic feet. Applying this figure to our present requirements, we should have an area of not less than five hundred million acres in well stocked forest to give us a continual supply of all kinds for our present needs. Now, a careful canvass made four years ago developed the result that the existing forest area in the United States, excluding Alaska and Indian Territory, comprised almost five hundred million acres (489,280,000); but it is well known to everybody who is acquainted with our forests that they cannot compare in yield with the average European Continental forests under systematic management. Much of what is reported as forest is useless brush land or open woods, and depreciated in its capacity for wood production by annual fires, by which the physical structure of the leaf mould is destroyed, and thus, too, its capacity for storing the needful moisture, reducing wood production, and killing all young growth.

Without care, without management, and left to the kind but uneconomical work of nature, interfered with, in addition, by rude and ignorant action of man, it is doubtful whether, on the existing area, one half the amount of wood is produced yearly which we now require. We have, therefore, beyond doubt, reached—if not passed—the time when increased drain means squandering of capital, and when regard to husbanding, to careful management, to recuperation of our forests, and planting of new forests is required for the purpose of merely furnishing raw material; and it should not be forgotten that to reproduce the quick growing white pine of an acceptable quality and sufficient size requires not less than eighty to one hundred years, and for the long leaved pine two hundred years; that, altogether, wood crops are slow crops; that nothing of size can be grown under a quarter of a century at the best.

That this is a business requiring intelligent national consideration is apparent. Not less so if we appreciate the magnitude of the values resulting from it. The total value of forest products in the census year was placed at $700,000,000, or ten times the value of the gold and silver production, five times the value of all coal and mineral production, and exceeding every one of the agricultural crops, corn and wheat not excepted; and representing in value about thirty per cent. of the total agricultural production.

Of injuries wrought locally by the reckless clearing of hill sides and of deterioration of the soil due to inconsiderate action of man, I could entertain you by the hour. The country is full of examples. Any one who wishes to study the effect of such denuding of hill sides upon the soil, the water flow, and agricultural conditions, need not go to France, Spain, Italy, Greece, or Palestine. The Adirondack Mountains are within easier reach, where the thin cover of earth exposed to the washing rains is carried into the rivers, leaving behind a bare, forbidding rock and desolation, while at Albany the Hudson River is being made unnavigable by the *debris* and soil carried down the river The government has spent more than ten million dollars, I believe, and spends every year a goodly sum, to open out a passage over the sand bar thus formed.

Go to the eastern Rocky Mountains, or to Southern California, and you can gain an insight into the significance of regulated water supply for the agriculture below, and also learn how imprudently we have acted and are acting upon the knowledge of this significance by allowing the destruction of mountain forests in the most reckless and unprofitable manner. Along the shores of Lake Michigan, and along the sea coast, we are creating shifting sands by the removal of the forest cover, to make work for the ingenuity of our children in devising methods for fixing these sands again. The vegetable mould with which the kind forest had covered the alluvial sands of the southern coast plain we are taking pains to burn off in order to replace it with expensive artificial fertilizers.

That the great flood of the Ohio, which cost the country more than twenty million dollars, was entirely due to deforestation, I will not assert; but it must have been considerably aggravated by the accumulation of minor local floods, due to the well known reckless clearing of the hill sides, which sent their waters down into the river in torrents. At the season when the winter snows are melting, watch the newspapers, and you will find an almost daily mention of the disastrous ravages of brooks and streams, many of which injuries could have been prevented by avoiding the creation of their distant and indirect cause. Thus we may multiply examples all over the country, showing harmful local influences upon agricultural conditions due to forest devastation.

That the vast stretches of land in the Northwest, from which the white pine has been cut and burned off, present the aspect of a desolation which sickens the heart, you may hear from every one who has seen these deserts unnecessarily wrought by man. Every traveler in this country, be it to the White Mountains, to the Adirondacks, along the Alleghany Mountains, be it through the Rockies or the redwoods of California, cannot but be startled by the desolate, sad aspect of many of these once beautifully clad mountain crests.

And we are a nation hardly a hundred years old, with over thirty acres per capita to spread ourselves upon. What will become of us when we must live upon five acres per head? We are far enough advanced in our recklessness of disregarding the indirect significance of forest areas to have learned a lesson at home, and to feel the necessity of being more careful in the utilization of the forest, so as not to lose its protection for our agricultural and general interests.

The means for its solution I may only briefly indicate. They are education, example, encouragement, legislation. Some of these are of slow effect. Others can be made to give results at once. Let the United States government, which still holds some seventy million acres of the people's land in forests, mostly on the Western mountains, where its preservation is most urgently needed—let the government set aside these otherwise valueless lands, and manage them as a national forest domain, and then the first effective step, a feasible and not a forcible one, is made. Let the military reservations on the Western treeless plains, which are still in the hands of the general government, be planted to forests and managed as such. This would be no doubtful experiment, would interfere with nobody, would enhance the value of the surrounding country—and education, example, and encouragement are provided, as far as it is in the legitimate province of the general government. And such example, instead of costing anything to the country, can be made self-sustaining—nay, productive—and would add appreciably to the people's wealth.—*B. E. Fernow.*

Mortar containing sugar has been employed in building the new Natural History Museum in Berlin, and has proved far superior to common mortar. It sets almost with the firmness of a good cement, while mortar made with molasses became soft and brittle after a time. In Madras a mortar is used with which either sugar, butter or buttermilk, shellac and eggs are mixed. It holds well and takes a marble-like polish.

A RESIDENCE FOR $8,000.

The perspective and plans herewith presented are from the designs of Mr. S. W. Whittemore, architect, East Orange, N J. The general dimensions are: Front, 36 feet, exclusive of bay windows; side, 51 feet, exclusive of piazza and laundry. Height of stories: Cellar, 7 feet; first story, 10 feet; second story, 9 feet 6 in.; attic, 8 feet.

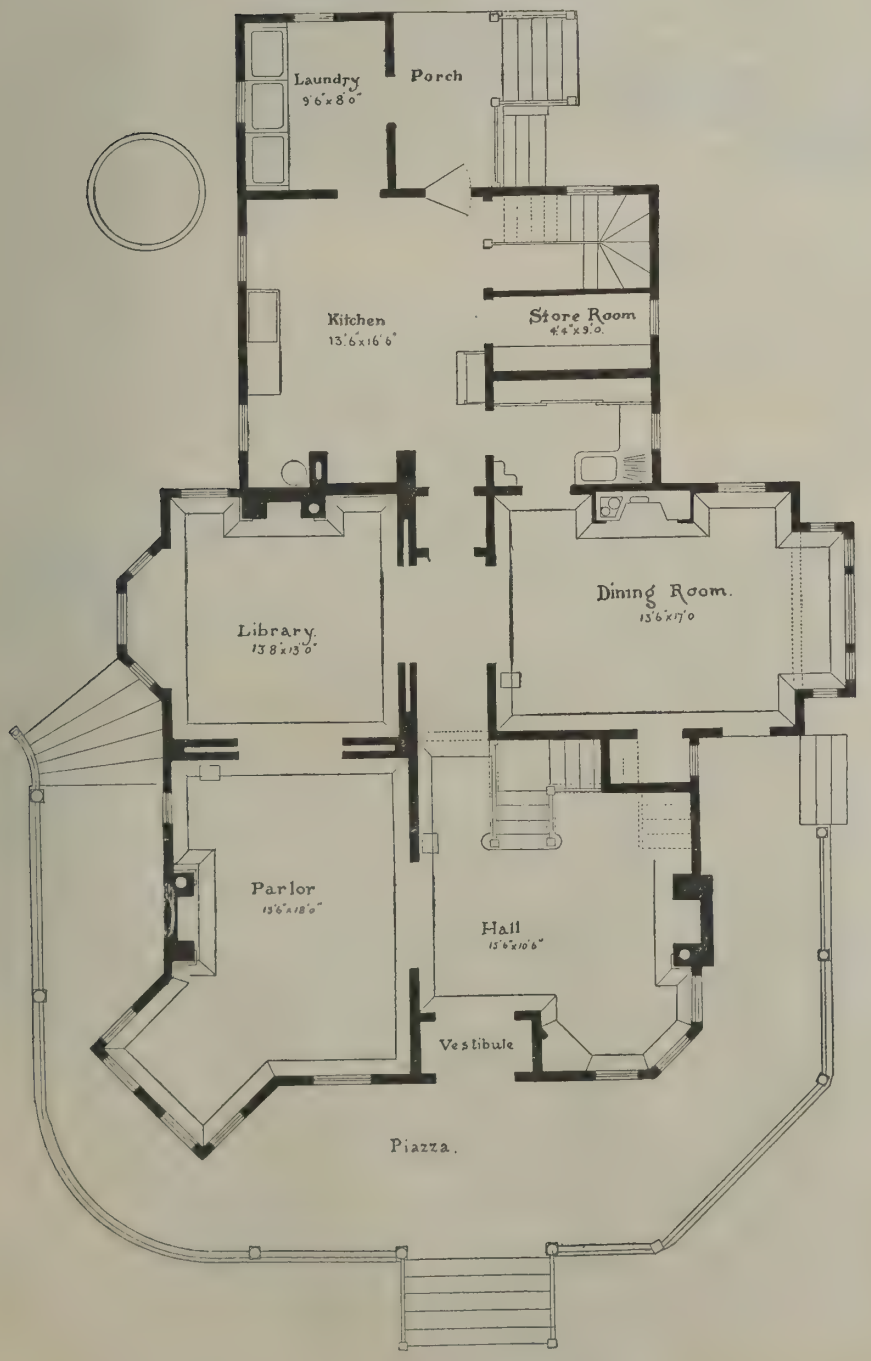
Materials.—Foundation, stone; first and second stories, clapboards; roof, shingles.

Cost.—$8,000.

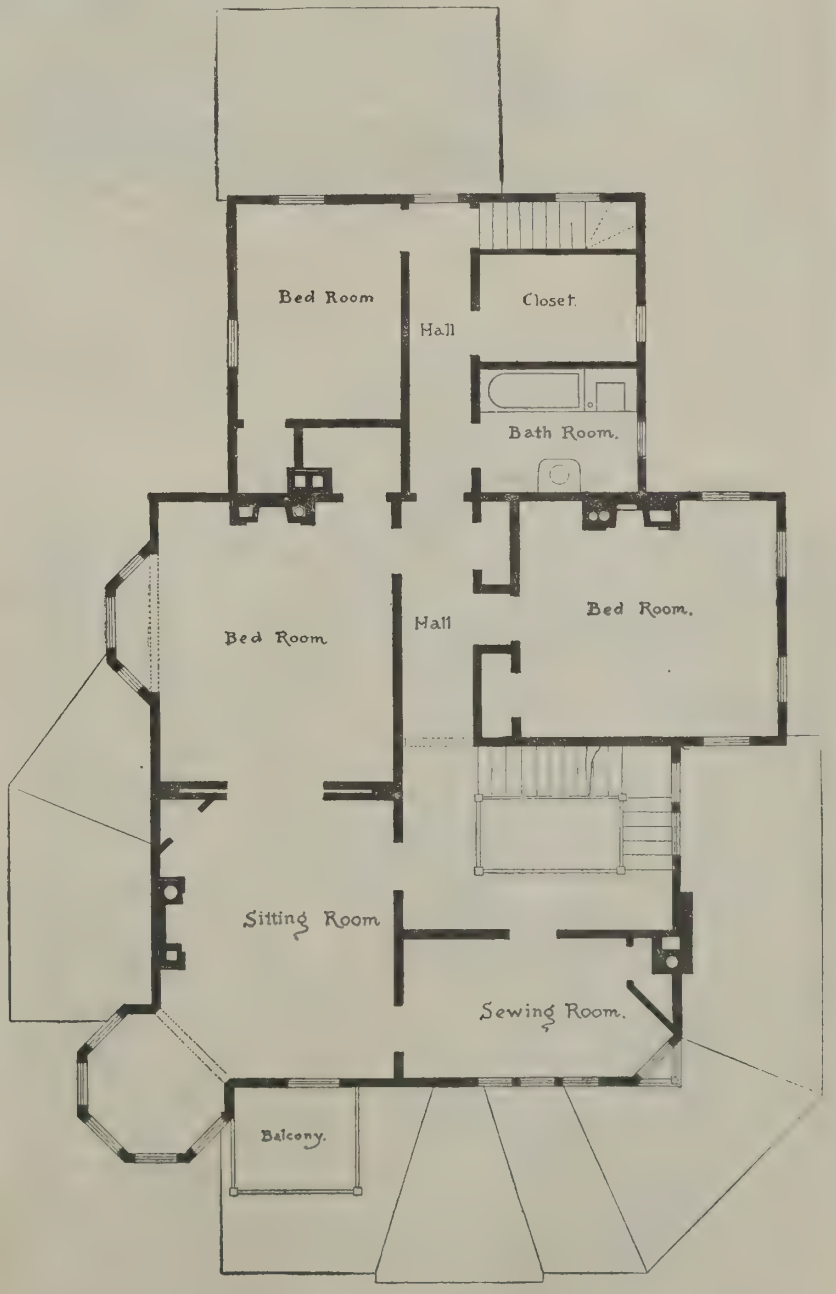
Fireplaces are provided in the dining room, library, parlor, and hall. The attic is finished throughout. Cellar under the whole house except laundry.

Bamboo Tree.

Writing from China, a correspondent says that the Chinese have developed the culture of the bamboo tree very wonderfully. They can produce a perfectly black as well as a yellow bamboo. The Emperor of China has one officer whose duty is to look after his bamboo gardens. This valuable tree is found in all tropical and sub-tropical regions, both in the eastern and western hemispheres. An attempt has been made in England, and with some success, to raise a dwarf species found at an altitude of 12,000 feet in the Himalaya mountains. The new world furnishes bamboo of the greatest diameter. The stems are usually very slender, but in the northwestern part of South America is found one species with a diameter of 16 inches. The Chinese put this plant to a greater variety of uses than any other people. Some kinds of it when it first shoots up from the ground are used as a vegetable as we use



First Story Plan.



Second Story Plan.

A RESIDENCE FOR $8,000.

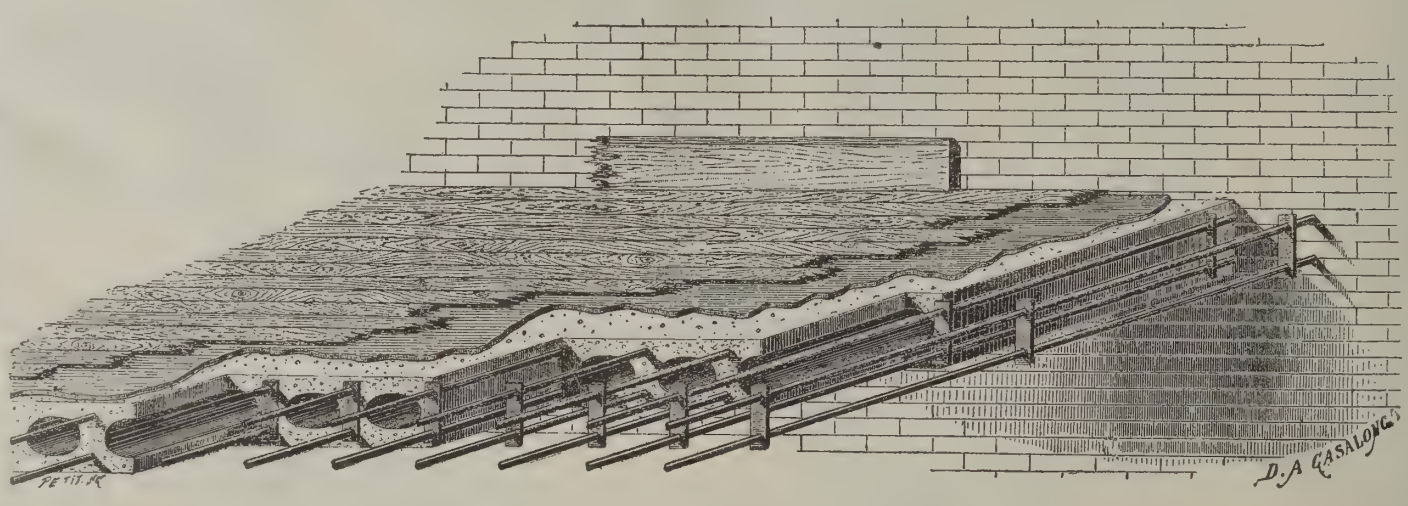
asparagus, or it can be pickled in vinegar or made into delicious sweetmeats. The plant has to be 30 years old to blossom, and then it bears a great profusion of seeds and dyes. These seeds may be used like rice, and a kind of beer may be made from them. In 1812 severe famine in portions of China was prevented by the sudden blossoming of a great number of bamboo trees. The stems of all the varieties are remarkably silicious. One kind found in Java is so hard that it strikes fire when the hatchet is applied to it. This has only a very slender stem, which is polished and used as stems for tobacco pipes. This Protean tree furnishes material for houses, boats, cordage, sails of boats, telescopes, aqueduct pipes, water-proof thatching, clothing, water wheels, fences, chairs, tables, book cases, boxes, hats, umbrellas, shields, spears, and paper. The pith is used for lamp wicks, so there is no part of it that cannot be used for something. From some of it exquisite carvings inlaid with gold and silver are cut, that exceed in beauty the ivory carvings for which the Chinese are so famed. Recently it has been put to another use. Mr. Edison has found that the carbonized fibers of the bamboo furnish the best material for the incandescent electric lamp, and has made use of it in his system of lighting. In Burmah and Siam whole cities are built from bamboo. These houses are made in pieces, lashed together, and raised on posts several feet high.—*The Lumber World.*

FIREPROOF STRUCTURES.

An article recently published by us apropos of the Opera Comique catastrophe has brought us several interesting communications, and, among them, one from Mr. Hennebique, one of the designers of the 948 foot Belgian tower. Mr. Hennebique has established the fact that structures in which iron is used in the flooring do not arrest the ravages of fire, but fall even more quickly than those in which wood is employed.

In fact, the beams that support the ceiling joists, flooring, and laths, naturally combustible materials, are raised to a high temperature, and, becoming red hot, bend under their own weight, and at the same time shove the walls outwardly.

The flooring of Mr. Hennebique's invention, which is composed of a cement made of coal ashes, plaster rubbish, and hydraulic lime, is refractory enough to resist the heat developed by combustion.



HENNEBIQUE'S FIREPROOF FLOORING.

As may be seen from the figure, this flooring consists of tubular girders resting upon very simple metallic anchorages. These girders are of the composition above described, and thus constitute a sort of monolith upon which any sort of a floor can be laid—terra cotta, marble, wood, etc.

Aside from its being nearly completely incombustible, this sort of flooring presents a great advantage, from an economical standpoint, in consequence of the rational utilization of the materials employed. It is unnecessary to say that the metal is perfectly protected against oxidation.

Another advantage of this flooring is that it almost entirely prevents the propagation of sound.

As may be readily seen, this mode of construction is applicable to different uses and to every possible sort of decoration, such as cornices, compartment ceilings, girders of various styles, as well as pillars, pilasters, columns, and supports of every shape and every resistance.—*Chronique Industrielle.*

Construction of Chimney Flues.

In a letter to the *Insurance World* Mr. Thomas Boyd, architect, of Pittsburg, Pa., gives the following practical information:

I have had considerable experience in examining buildings burned by fire, having been associated with my father for eleven years, and during that time have examined hundreds of buildings destroyed by fire. I have traced more fires to the cause of defective flues than to any other source, and I could refer you to buildings, not only in this city but in others, where fires have occurred from this cause, and the insurance men and the public in general stated that the fire occurred from "unknown causes," as it was first seen many feet away from the flues.

In seventy-five cases in one hundred where fires occur from "unknown causes," it can be traced to defective brickwork. Ordinarily, an architect specifies that the brickwork shall be well slushed, and that the flues shall be well pargeted or plastered on the inside. This is a great error, as no flues should be plastered on the inside, and no walls having flues in them should be slushed, as the term is generally understood.

The flues should in all cases be built smooth on the inside, and all the joints should be filled full of mortar, the vertical joints as well as the bed joints. The lining of the flue or the four inches surrounding the flue should always be kept in advance of the brickwork, and the brick adjoining the lining and the second and third brick, and so on, should be shoved in soft mortar up against each other. This will fill all the vertical joints from bottom to top as laid. The slushing that is ordinarily put in from the top only goes down into the joint about ½ inch, thus leaving an opening the entire length of the wall, and in some cases an opening which a mouse could crawl through. As it is only a question of time when all the plastering that can be put on the inside of a flue will fall off, it will leave these vertical joints between the bricks open into the flue, and as the joists cross through these joints in the brickwork, fire is liable to take place ten or twenty feet away from the flue. I have taken down many old buildings in which these joints were filled with carbon or soot.

If the flues are built as above described, any competent builder or architect can find out whether the mechanics doing the work are slighting it or not; but if the inside of the flue is plastered or lined with terra cotta or any other material, you cannot tell whether the wall is properly built or not until this plastering falls off, which it will in the course of a few years. Thus all buildings erected with plastered flues are liable to burn at any time.

I have made a practice for a number of years of building flues without lining them, and then when the house is built, or as each story is erected, I put a dense smoke in the flue and close the opening at the top. If there is a hole the size of an ordinary pin head, the smoke will find it and penetrate into the interior of the wall adjoining the flue.

Roadside Plantations of Trees in Belgium.

The roadside planting of trees is carried out on a most extensive scale in Belgium, forming a marked feature in the landscape of that country. According to the report of M. J. Houba, State Head Bailiff or Ranger of Woods and Rivers in Belgium, recently published in the *Revue Horticole*, the total length of the highroads of Belgium in 1881 amounted to 4,227 miles, classified, as regards tree planting, in the following manner:

	Miles.
Roads already planted	2,417
" still to be planted	264
" which cannot be planted	1,546
	4,227

From this it will appear that, at the date mentioned, more than half the entire length of the Belgian highroads had been planted, and that the proportion would soon reach two-thirds.

The number of trees used in forming these plantations amounted to 871,685, representing in 1881 a money value of £415,986, the average cost of each tree when planted having been about 2s. 6d. The plantations had therefore at this date increased in value to nearly four times the amount of the capital originally expended upon them.

The trees principally employed in these roadside plantations (already made) are: Elms, 371,621; oaks, 130,828; poplars, 80,853; ash, 73,893; beech, 32,970; maples, 27,755; service trees, 24,630; Norway spruce, 43,767; larch, 41,699. It will be seen from this list that coniferous trees are largely used in Belgium for roadside planting. On the other hand, the report only gives 897 plane trees, 976 acacias, and 672 cherry trees, apple trees, and pear trees, showing that while the Belgian authorities fully recognize the great utility of these roadside plantations in other respects, they especially aim at the production of timber of good quality in a commercial point of view.—*The Garden.*

An Egyptian Temple.

An Egyptian temple appears to have been one of the most imposing assemblages of buildings that can be well conceived. Avenues lined with hundreds of sphinxes on each side led the worshiper to the sacred precinct for the distance of thousands of feet, and thus the mind, even when remote from the vicinity of the temple, received an impression calculated to excite veneration. This avenue was terminated by a stupendous mass of pyramidal form, above 200 feet wide and about 80 feet high, whose enormous proportion was naught diminished by the vastness of the plain in which it stands, nor by contrast with the mountains that overhung it. In the center of this propyleum is a door, flanked in advance by an obelisk on each side, about 90 feet high, and beside which are figures of colossal dimensions, 45 feet high, sitting as guardians of the sacred portal. The effect of the whole is gigantic, and calculated to impress the coming worshiper with the fullest notions of his insignificance in the scale of material nature. The triumphal gateway being passed, a magnificent court meets the eyes of the beholder, having on each side a colonnade. And this court led to a densely columned hall or vestibule, under the shades of which the crowds of Egypt's sons and daughters reposed to recover from the exhaustion and fatigue caused by their journey under a burning sun to the fane of their creature god. And here the mind also dwelt awhile on the first impressions produced by the contemplation of the overpowering majesty of the gorgeous mass. For the huge propylea, which inclosed either end of the court, and the hall, with its forest of clustered columns, which the eye could not number, and the playful variety and copiousness of channeled hieroglyphics which left not a space uncovered, and the brilliancy of the pigment which gave an endless variety to the shafts and capitals of the columns, to the beams, the walls and ceilings, bewildered the attention, and left not a moment of repose to the wondering stranger. A lofty central avenue of columns, above 60 feet high, forming, as it were, a triumphal way, leads under a third portal, of dimensions by no means inferior to the others just mentioned, and marked with what care and with what sanctity the priests guarded every approach to the inner parts of the temple. But this gateway passed, and a scene the most sublime burst upon the view. An ample peristyle much larger than the one already passed, presented itself to the eye, probably planted with trees, crowded with metaphoric statues.

On either hand a double avenue of columns, less for convenience than dignity of effect. In the center uprose the portico of the mass of building, that formed the temple itself — the columns in dimension more lofty, in decoration more rich, in proportion more graceful than those of the courts. The dynasties that had ruled over the country up to the period of the erection of this temple have their histories graven on the walls and on the columns. The same pyramidal form gives an appearance of endless durability to the mass, which is surmounted by an immense hollowed cavetto having the center occupied by the sculptured form of the agatho demon, or winged globe and serpents, with outstretched wings extending over the center intercolumniation of the facade, and seemingly a being of another world. Admitted beneath this porch, the minds of the worshipers are prepared for the gloomy inner penetralia, where every object was mysterious and emblematic. Numerous doorways closed by curtains succeeded each other, and led from vestibule to vestibule, which hindered the eye from penetrating with sacrilegious gaze into the inmost sanctuary, all access to it being forbidden to the multitude.

To these vestibules the light of day was denied, and the mind was subdued by the gloom of the spot, for the attention was absorbed by the contemplation of the sacred mysteries of the place and by the effects produced on the attention by the huge incongruous figures of granite—monstrous reflections of the gloomy minds of the religious inhabitants of the sacred precinct, who sought to deify matter and the animal instincts.—*T. L. Donaldson.*

The White Ash.

"About twenty years ago, Prof. J. L. Budd, of Ames, Iowa, advised keeping the seeds of the ash through the winter in kegs or boxes, mixed with clean moist sand, taking care that they become neither too wet nor too dry. Freezing will do no harm. The ground should be marked and prepared as for corn, and planting at the intersections, placing four to six seeds in the hill. They should be carefully cultivated, and the next spring thinned to one plant in each hill, the vacancies being supplied. By planting thus thickly, the young trees get a straight growth. At the end of six years every alternate row north and south should be thinned out, and at the end of ten years every alternate tree in each row. When twelve years old, on good soil and proper culture the first four years, the grove would have 12,000 trees on ten acres, averaging eight inches in diameter. By cutting the stumps close to the ground, and covering with a light furrow on each side, a second growth is obtained in eight or ten years, more valuable than the first."

Prof. C. S. Sargent, in speaking of this timber, says: "To develop its best qualities, the white ash should be planted in a cool, deep, moist, but well drained soil, where it will make a rapid growth. That the plantation may be profitable as early as possible, the young trees should be inserted in rows three feet apart, the plants being two feet apart in the rows. This would give 7,260 plants to the acre, which should be gradually thinned until 108 trees are left standing, twenty feet apart each way. The first thinning, which might be made at the end of ten years, would give 4,000 hoop poles, which at present price would be worth $400.

"The remaining thinnings, made at different periods up to 25 or 30 years, would produce some three thousand trees more, worth at least three times as much as the first thinnings. Such cutting would pay all the expenses of planting, the care of plantation, and the interest on the capital invested, and would leave the land covered with trees capable of being turned into money at a moment's notice, or whose value would increase for a hundred years, making no mean inheritance for the descendants of a Massachusetts farmer The planting of the white ash as a shade and road side tree is especially recommended, and for that purpose it ranks, among our native trees, next to the sugar maple."

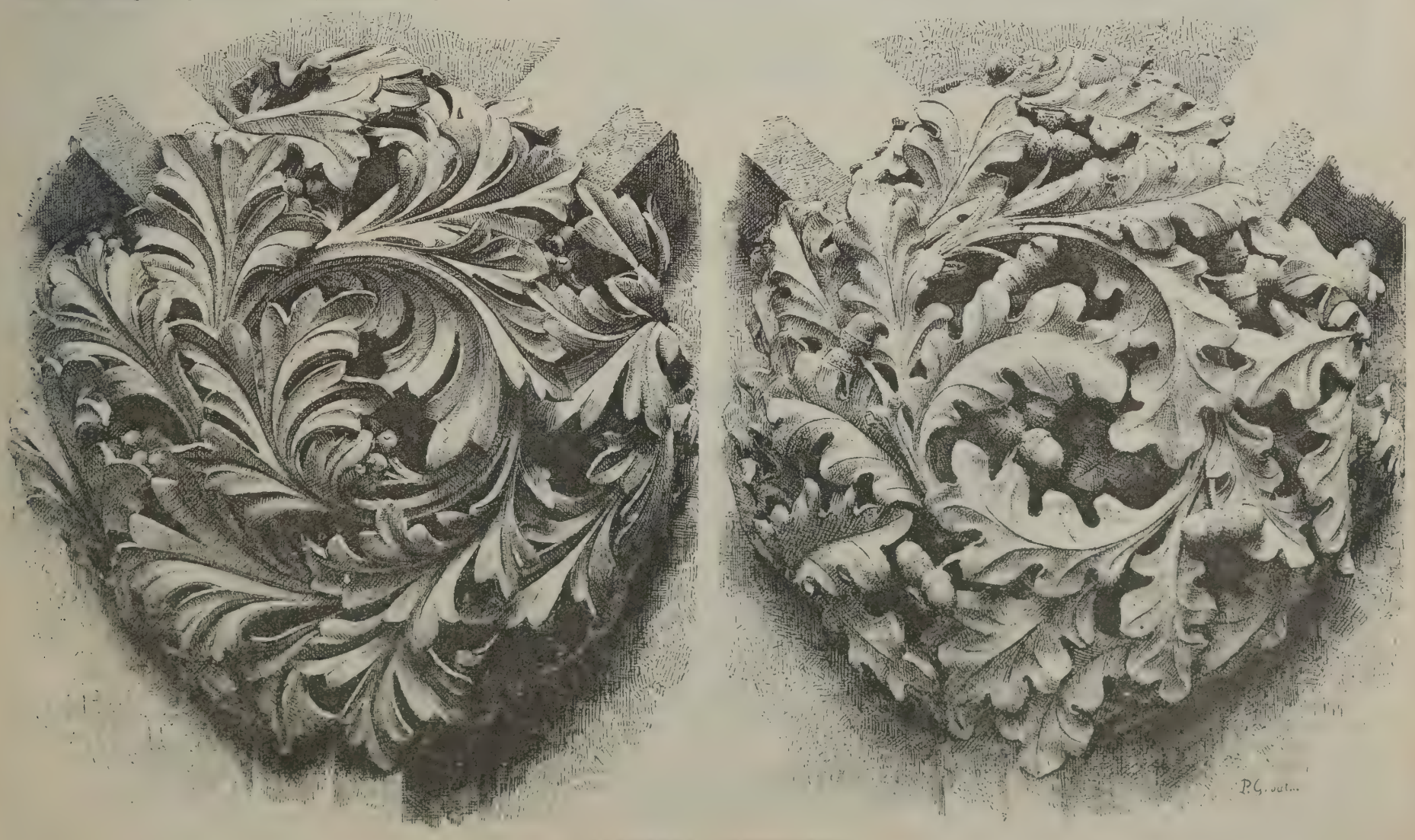
Prof. B. G. Northrop says in reference to this tree: "One of the most valuable of our native trees is the white ash, and, all things considered, it is one of the most profitable for planting. Combining lightness, strength, toughness, elasticity, and beauty of grain in a rare degree, it is in great and growing demand for farming tools, furniture, interior finishing of houses and railroad cars, the construction of carriages, for oars and pulley blocks, and many other purposes. The excellence of our ash is one secret of the preference given abroad to American agricultural implements. It is hardy, will bear the bleakest exposure, is a rapid grower and attains large size, but will not thrive on poor lands. It is every way superior to the European ash, much as that has been cultivated and lauded abroad. It is now found widely in the nurseries and young plantations attached to the forest schools of Europe. Director General Adolfo di Beranger, president of the Royal Instituto Forestale, at Vallombrosa, pointed me to his plantations of *Fraxinus Americana* with a tone which implied that is the tree of which Americans may well be proud.

"The ash is a fine ornamental tree for private grounds, public parks, or for the wayside. When planted closely for timber they grow straight and free from low laterals, and early reach a size that makes the thinnings valuable for poles and fencing.

"The seeds of the white ash are abundant, ripening by the first of October. They may be easily gathered after the first frost. If sown in the fall, they should be covered with three inches of straw. If to be sown in the spring, the seed may be mixed with damp sand."

Sawdust.

Sawdust has been a source of worry and expense to mill men in various ways, though it is to be admitted that in utilizing it to some extent as fuel they have in part solved the problem of its economical disposition. Lately, there has sprung up a certain demand for it, and the problem of its cheap shipment is now one that presents itself. A Yankee inventor has tried baling it, and appears to have devised a scheme that accomplishes the purpose successfu[illegible] the sawdust into bales, and [illegible] progressed so far as to be a[illegible] compress thirty-two cubic fee[illegible] a quarter of a cord, into a packag[illegible] three feet long by two feet on each of its sides. As this occupies only twelve cubic feet, the reduction is sixty-two and one-half per cent. of its original bulk. The machine used is nothing more than an ordinary hydraulic press, which is arranged in a manner similar to a hay or cotton press. The sawdust is pressed into bales and at the same time inclosed in a burlap covering, making a neat and easily handled package for shipment. Small pieces of wood, shavings, etc., may be baled with the sawdust or separately with equal facility. It appears a simple method of putting this bulky stuff in convenient shape for shipment, and it would seem might be employed to advantage wherever a market can be found for this species of mill refuse.—*The Timberman.*



ORNAMENTAL KEYSTONES.

DWELLINGS AT GLENRIDGE.

We illustrate a few of the tasteful residences which have been erected at Glenridge, N. J., a charming suburb of New York City, situate on the line of the Delaware and Lackawanna Railway. Glenridge is 14 miles from New York, and the time required for the trip, including the ferry across the Hudson River at New York, is about 40 minutes. The dwellings we have chosen for illustration have been recently erected. They vary in cost from $4,000 to $6,500 or more. We can supply on application such further information as readers may desire.

GLENRIDGE.

Fire Bricks.

Mr. W. Y. Dent, in a Cantor lecture at the Society of Arts, London, on building materials, gave an account of some of the chemical problems involved in the constituency of fire clay and fire bricks.

The plastic clays consist of silica and alumina chemically combined with water. They are hydrated silicates of alumina, the plasticity depending upon the water that enters into their composition. The water with which the clay is chemically combined can be expelled at a temperature a little above that of boiling, without detriment to its plasticity, but the whole of the water contained cannot be driven off without raising the temperature to dull redness. Silica, alumina, and lime are separately very infusible substances, and are capable of resisting exposure to very high temperatures without softening. It is on account of its extreme infusibility that lime is found to be the most suitable material for the cylinders upon which the oxyhydrogen flame is made to impinge to produce a brilliant light, the intensity of the light being due to the extremely high temperature to which the lime is raised. Lime, however, from its want of cohesion, could never be brought into general use for such purposes as fire clay is employed, and this is also the case as regards silica, which requires the addition of some substance of a basic character, with which it will unite, and so cause the particles to bind together. The nearest approach to the use of silica alone as a fire brick is in the case of the Welsh brick, made from the Dinas rock in the Vale of Neath.

This material, before being made into fire bricks, had long been used for repairing the furnaces at the copper works of South Wales, for which purpose its peculiar property of expanding when subjected to the influence of a high temperature, instead of contracting, as in the case of some other fire clays, renders it particularly suitable, the cementation of the bricks being facilitated by the increase of temperature. This Dinas rock occurs in various conditions, from that of a firm rock to that of disintegrated sand, and a mixture of about 1 per cent. of lime is, therefore, necessary in order to make it into bricks. Dinas bricks will stand very high temperatures, but are more friable than ordinary fire bricks, and will not resist to the same extent the action of basic substances, such as furnace slags, containing much oxide of iron. They are, besides, porous and readily absorb moisture, rendering it necessary for furnaces built of them to be gradually heated, as they are liable to crack if sufficient time is not allowed for driving off the moisture. The composition of the clay used for fire bricks is a question of great importance, inasmuch as its quality depends greatly upon its chemical constituents, although its power of resisting fusion, when exposed to intense heat, is effected by its mechanical condition.

The same materials, when mixed together in the form of a coarse powder, will require a higher temperature to fuse them than would be the case if they were reduced to a fine state of division. The qualities required in fire bricks are that they should bear exposure to intense heat for a long time without fusion, that they should be capable of being subjected to sudden changes of temperature without injury, and that they should be able to resist the action of melted copper or iron slag. The Dinas brick, which contains 98 per cent. of silica, will bear exposure to a higher temperature than most others, but it will run down sooner when in contact with melted iron slag. Ganister is the name given to a fine grit which occurs under certain coal beds in Yorkshire, Derby, and South Wales, and the black ganister from the neighborhood of Sheffield is especially adapted for lining cupola furnaces, owing to its capacity to stand high temperatures without shrinking, in consequence of the large quantity of silica it contains

Fire bricks made of silicious clays from granitic deposits in various parts of Devonshire also contain a large proportion of silica, but their powers of supporting exposure to high temperatures are materially increased by the coarseness of the particles of disintegrated granite of which they are composed. The material employed for the Dinas bricks, as well as the others mentioned, differs considerably in its character from what is ordinarily understood by the term fire clay, as used in the manufacture of the celebrated fire bricks of Blaydon Burn, Stourbridge, or Glenboig; the quality of which, as regards their chemical composition, depends upon the relative portions of silica and alumina, and their freedom from iron oxide and alkaline salts, the presence of which tends to render the clay more fusible.

Improvements in Making Portland Cement.

Clay is taken as dug from the pit, without being dried, and mixed with the usual proportion of lime, a portion of which is used as limestone, the remainder as freshly burnt lime. The burnt lime is first added in such proportion that the water in the clay exactly suffices to slake it, and the heat given out effects the necessary drying. The limestone is then added and the mixture ground in a mill to the usual degree of fineness, made into bricks, calcined, and the "clinker" reduced to a fine state of division as usual.

Typhoid Fever Carried by Well Water.

The following account of the transmittal of cases of typhoid fever by well water is sent us by Dr. Henry B. Baker, secretary of the Michigan State Board of Health. It is made to him by Dr. H. McColl, of Lapeer, Mich.

Dr. McColl reports: About September 1, 1887, Myron Gardner, railroad employe, came from the South sick with fever to his father's house. He was supposed to be malarial. No care was exercised with stools in the way of disinfection, but they were thrown into privy vault in rear of house, and in close proximity to well. Wash water was thrown on the surface of the ground, which was very dry at the time. About September 7 or 8, a copious rain fell and soaked the sandy soil; and on September 14, Wm. Gardner and wife, father and mother of Myron, and E. D. Gardner, a brother (who was a student in my office), and who boarded at home, were attacked with fever. On this day I got home from Washington, and found four of them down with a severe type of typhoid fever; and in two weeks Myron's wife and child were attacked; also a child across the street at Terry's, who had used water from the Gardner well; about the same time three cases in the Clifford house, south of Gardner's, who also used water from the Gardner well. None of the people from either of these houses were in the Gardner house. In the Walker house, still further south, one case has occurred, and I was at a loss to account for this case till a few days ago, when the young man said that at the mill where he was working they had used the Gardner water for a few days, owing to the disarrangement of the pump at the mill. Two others of the mill hands —Anderson and Lester—who used the same water were attacked about the same time. Lester is now convalescent. Anderson is dead, as also the child at Terry's. When I took charge of the cases, I ordered the discontinuance of water from the Gardner well and the disinfection of the stools, and no new cases are now reported. People who assisted to take care of the Gardner and other families, and who use water from other sources, have not been attacked. Clearly, Myron Gardner brought the fever home, the well became infected after the first rain from slops and privy, and the other cases got their seed from the water.

Dr. Baker adds: The foregoing instructive account of the way typhoid fever was spread, in one instance, is produced in the hope that it may lead others to trace the spread of this important disease, and, what is of greater importance, act intelligently for the prevention and restriction of the disease, as Dr. McColl did in this instance.—*Sanitary News.*

An Unsafe Church.

About a month ago, Inspector of Buildings Griffin discovered that the wall on the southern side of the Warren Avenue Baptist Church, Boston, Mass., was bulging. He climbed to the roof, and was astonished to find that the scissors truss that supported the pitch of the roof was not bolted together, but was fastened only with railroad spikes.

The wall was out of plumb fully nine inches. A peremptory order was issued to vacate the church. Then a more careful examination was made, with startling results.

The truss was laid bare, and then it was discovered that the sole support for the roof of the great building consisted of three iron rods one and one-half inches in diameter.

The cross rods were of no use, because the wood had shrunk away and the bolts could be rattled. The upper and lower chords of the truss were made of eight two-inch planks, and where the cross rods had been put through and clinched the auger had cut off one plank and part of another, weakening the truss by one-eighth.

The lower chord of the truss was cut completely through in two places. It is said that it will cost nearly $200,000 to repair the church, which is one of the largest in the city.

It would not be a bad idea for the trustees of other churches to have the trusses carefully examined.

GLENRIDGE.

Cedar Pavements.

To pave a city with cedar would seem to be a luxury, but it appears that in the city of Chicago, out of 277·71 miles of paved streets, there are 213·35 miles of cedar blocks, of which nearly forty miles was laid last year, and the Chicago *Tribune* says it is the cheapest pavement laid in the city. Dead cedar brought from the vicinity of Green Bay, Wis., was first used, but it was found that it did not wear well, and live timber is now required. The cedar is a tree which does not taper rapidly, and one of good size should furnish a stick 30 ft. long. The logs are brought here by boats in lengths of about 6 ft., with the bark still on, peeled, and cut into blocks 5 in. long. The blocks range in diameter from 3 in. to 9 in., and cost 50 to 60 cents a yard, measurement being made after they are laid. The process of paving a street with cedar blocks is much the same as was used with the Nicholson pavement. A sand foundation is first provided, and on this are laid boards which serve as stringers. On the stringers planks are placed parallel with the curb, and the cedar blocks are stood on end on the planks. The interstices between the blocks are filled with gravel and coal tar.

For the last three years block pavement has cost in Chicago from $1.00 to $1.30 a yard. The life of cedar block pavement is three to seven years, and it is an excellent pavement when first laid. It is believed by many to be detrimental to health from the fact that it absorbs all liquids falling upon it, gives them back in the shape of vapor under the influence of the sun, and is itself constantly decaying. It is stated as a curious fact that this pavement wears out faster on streets where traffic is light than where it is heavy. Cedar blocks are used for paving all through the West, but more freely probably in Chicago than in any other city in the world. They are cheap, and that is a great point in their favor.

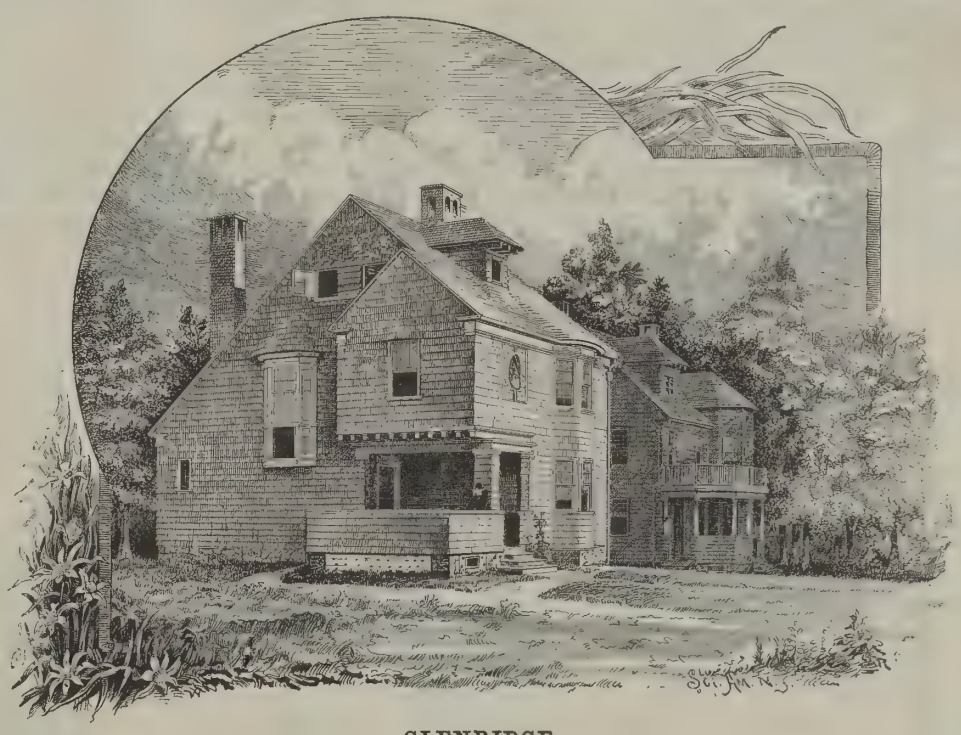
Hemlock.

Respecting the merits of hemlock, the *Minneapolis Lumberman* has a good word in its last issue. It quotes from a correspondent at Williamsport, Pa., regarding the experience with the wood there as a foundation for paving blocks; and in regard to a stretch of Nicholson pavement there which had been down sixteen years, goes on to say:

"The blocks had been placed on two thicknesses of one inch hemlock, the boards coated both sides with coal tar. When the pavement was taken up, the boards were found to be in good condition—so perfectly sound that they were put back again for possbly another sixteen years. The correspondent says that out of a mile of sixty foot street, less than 10,000 feet of the old planking was condemned. There seems to be no question as to the superlative merit of hemlock for paving purposes."

This is valuable testimony, and better evidence of the lasting qualities of hemlock under paving blocks than any Western experience has produced, for the reason that it has nowhere in the West been so long as that in use. It has been recognized, however, as a wood excellently suited to this purpose, and is employed almost exclusively wherever the cedar block pavement is freely used, which includes a good many of the large cities in the United States, and practically all Western towns in which any paving is done. It is apparent that lumbermen are beginning to take a strong interest in hemlock, and evidences of its growth in favor are becoming rather plentiful. It occasionally gets a setback from some local dealer, who has come off second best in an encounter with its slivers, but it is bound to come more and more in use in spite of the strong objection that is made to it by some users. Its light weight and great strength for many building purposes are factors that tell.—*Timberman.*

GLENRIDGE.



GLENRIDGE.

GLENRIDGE.

Collapse of Walls of Burning Buildings.

Mr. Alex. Black, writing to the *Building News*, says: The expansion of brick by fire heat may be estimated at rather above half that of wrought iron; and of mortar at about one-fourth more than that of wrought iron. The mortar joints in the wall may occupy, say, one-fifth to one-sixth of the height of the wall. There is no accurate data as to the maximum heat developed at Whiteley's fire. It, however, depends on the nature of the contents, etc., consumed and the accumulation of draught currents. If there is free lime, etc., in brick or mortar, there is added to the expansion more or less disintegration, which would become not the least potent cause of collapse.

We may assume that the interior surface of the brickwork exposed to the fire expanded, say, 1 in. in 8 ft. or 10 ft., vertically and horizontally, which would produce a distortion by buckling, or curving inward, dish-like, of the inside half thickness of the wall, both vertically and horizontally, leaving for a time the outside half thickness (say, for convenience of description) not much disturbed; in the meanwhile, air gets in between these inside and outside half thicknesses, or slices, and it may become gradually expanded by heat and help to force them further apart until the whole wall collapses.

In setting iron girders, the usual practice appears to be to build the ends solidly in the wall to act as a tie; but by having cross flanges at ends the wall may be built close to these on inside toward interior of building, and space left for expansion on their outside; but this space is of no use without the ends of the girders are set upon rollers or rockers, as is done for bridge girders, because the rigidity of wall would not be sufficient to withstand undisturbed the expansive pushing out, or horizontal thrust, of loaded girder end if resting upon a rough bearing plate or block.

If building timber joists into walls, it is a safe method to bevel off the upper corner equal to the bearing of the end in the wall, which allows the projecting portion of joist, if broken accidentally, to drop down without disturbing the wall, by the leverage which it would exert if built in the wall in the usual way.

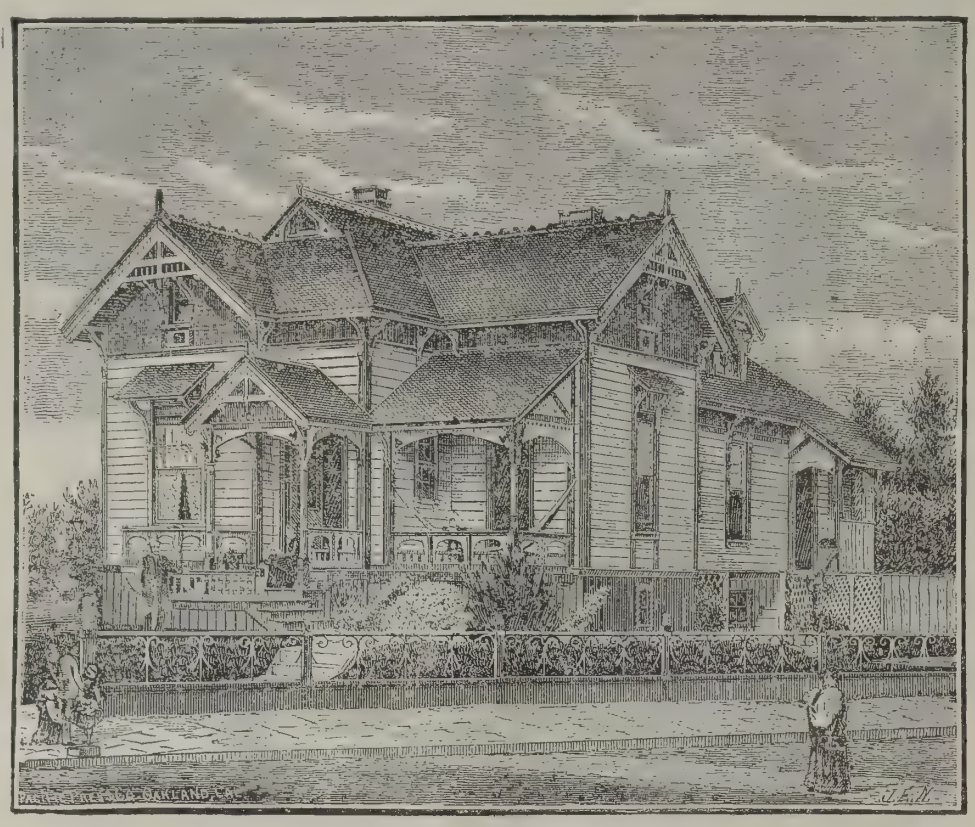
A $2,500 CALIFORNIA HOUSE.

California can justly boast of a larger number of pretty places and picturesque localities in which to erect residences of moderate cost than can be found in any other State in the Union. The beautiful town of Alameda, covering, as it does, a large extent of ground, embracing several square miles, may be regarded as a paradise for those who wish a quiet retreat, away from the din and confusion of the city, and yet be in close connection with the great mart. Nearly every portion of the town is covered with a natural growth of oak trees. Nor does this growth stop at this point. For a long distance to the north the ground is covered by the beautiful trees from which the neighboring city of Oakland derives its name

Extremes meet in architecture as well as other matters. Some æsthetic persons have sought to copy the humble abode of the laborer in the external view of a dwelling, while the internal arrangements and fittings rival those of Aladdin's palace. Others seek to have the outside present to the eye a conglomeration of whimsical ideas, while they have not deigned to cover the floors with a carpet, nor have a door between any of the rooms or halls, excepting those connecting with the outer world.

Much benefit has been derived from these whimsical erections, and it is only by much study and close application to the fancies of their clients that architects have been enabled to prepare the beautiful bijou plans, a good representation of which is given in this issue. In justice to the architectural profession, we must say that no portion of their practice has been so usefully bestowed as that which has been bestowed upon the production of plans for such homes, a full plan of which accompanies this article.

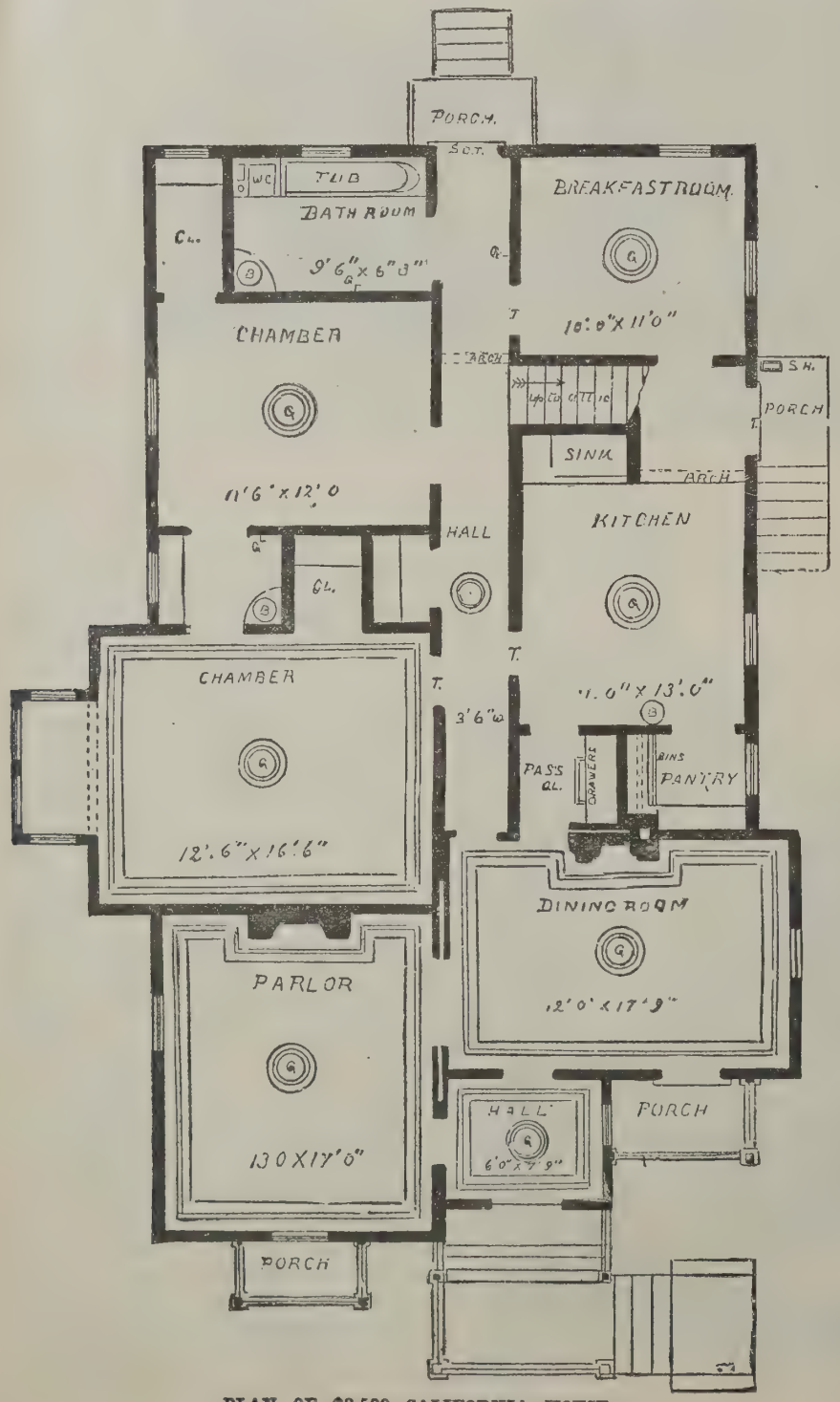
The elevation, as shown, is a model of neatness and economy. At once attractive in appearance and substantial in all its surroundings, it does away with all those horrible idiosyncrasies and bugbears of the Elizabethan and Queen Anne styles. There are no small windows to cause the one who cleans them to utter a whole vacabulary of cuss words at the architect who made so many corners to dig out. There is no part of California but what needs all the sunshine that was intended to enter a room, and the large windows shown allow the heat and light to make glad the hearts of the dwellers therein. Even with the thermometer at 100 degrees and over in the shade at noontime, still, when evening comes, the cool winds that invariably bless the sleep of those who are tired from their daily toil has easy ingress from these same large windows. And in winter, from the absence of snow in all of our beautiful valleys, the same windows are a source of joy and comfort for the occupants to observe the driving rains, or admit the blessed sunshine as it pierces through the wintry clouds.



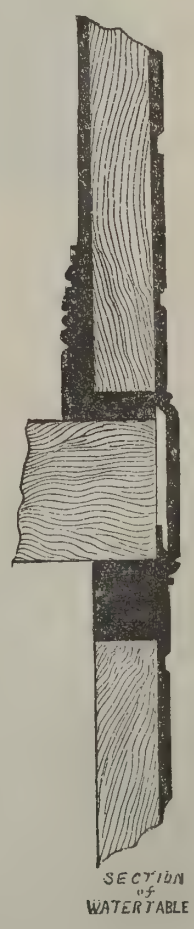
A CALIFORNIA HOUSE FOR $2,500.

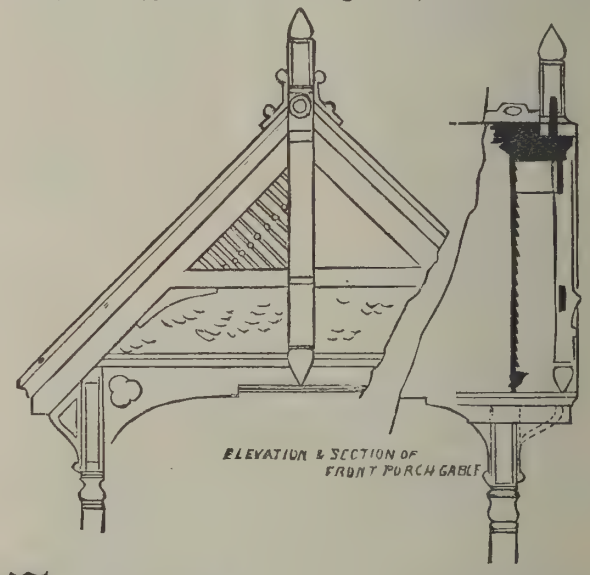
Great care should be exercised in painting the exterior. The colors selected should be a happy blending of light and dark shades. They should be graded from rich, heavy grades at the bottom to the lighter tones at the gable peaks, preserving, through the intermediate section, a consistent harmony. The roof may be of dark slate color. The trimmings may be colored with a combination of blue, black, and Indian red. The body of the house may be varied to suit the above. It must be distinctly borne in mind that all buildings of the same class cannot be treated alike. Trees have a wonderful effect on colors used, and the main study of the painter and owner should be that the salient points of form and detail be enhanced by the proper selection of the various colors. By all means, if you are building a home for yourself, take the good wife into your confidence, and let her judgment be given on the various colors to be used.

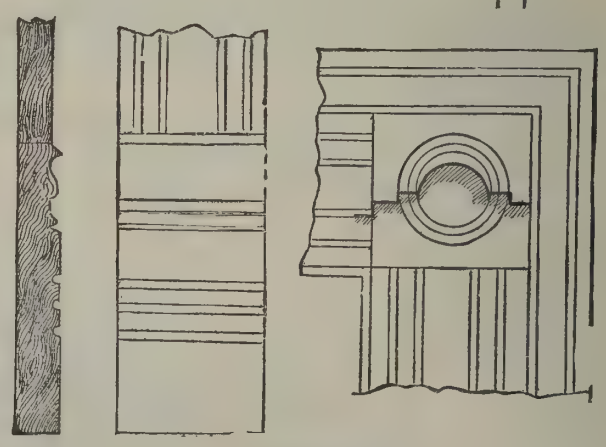
The arrangement of the rooms, as shown by the plan, is very desirable for any one with a small family. A feature is made of the entrance way. From the hall, one can pass either to the parlor or dining room, the latter being the general sitting room. The parlor is large—13×17 feet in size. It has a fireplace, as shown. A cornice is also designated. Sliding doors connect this room with the dining room, the size of the lat-



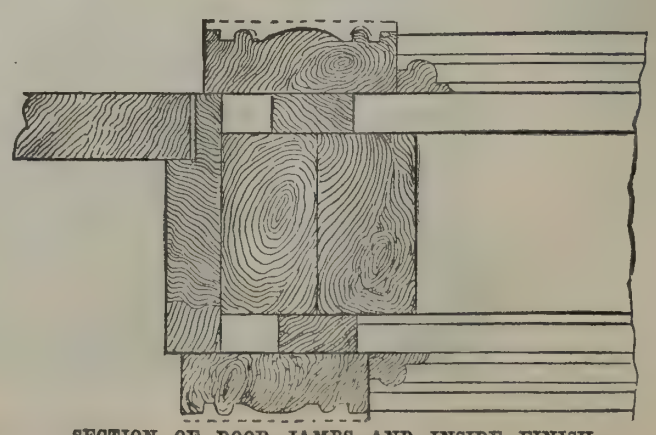
PLAN OF $2,500 CALIFORNIA HOUSE.







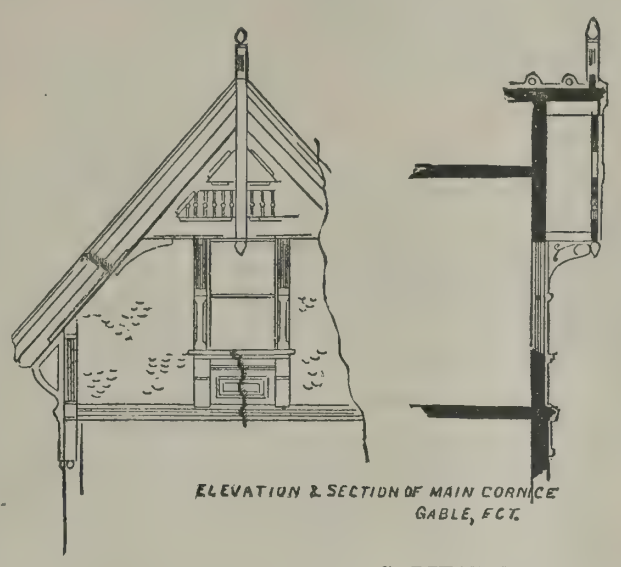
INSIDE FINISH.

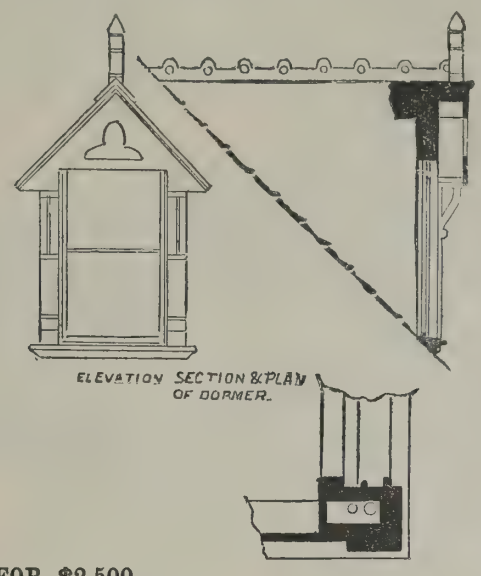


SECTION OF DOOR JAMBS AND INSIDE FINISH.

ter being 12×17¾ feet. A cornice and fireplace are also shown. In case of company or family gathering, the two rooms will be practically one. The porch shown in front will be very handy for the gentlemen who smoke, or, on warm days the ladies can use the same for sewing purposes, sheltered, as the plans show, by the roof overhead.

You pass from this room into a hall, from which you can enter all the rest of the rooms. The main chamber is 12 feet 6 inches by 16 feet 6 inches, besides a large bay window, having four windows for light and air. There is also a cornice in this room, and a place for a stove to connect with parlor chimney. There is a very large closet, and also wash room, which is well lighted and ventilated Passing along the hall, we next come to a large linen closet. This will be found very serviceable for the storage of the linen in daily use. Then comes a large chamber, 11 feet 6 inches by 12 feet. No cornice is shown. Should a fire be needed in this room, a patent flue could be placed therein, starting from near the ceiling. A large closet is also connected with this room. At the end of the hall is the bath room, 6 feet 3 inches by 9 feet 6 inches. A wash bowl and water closet are shown. The window, being directly over the tub, assures perfect ventilation.



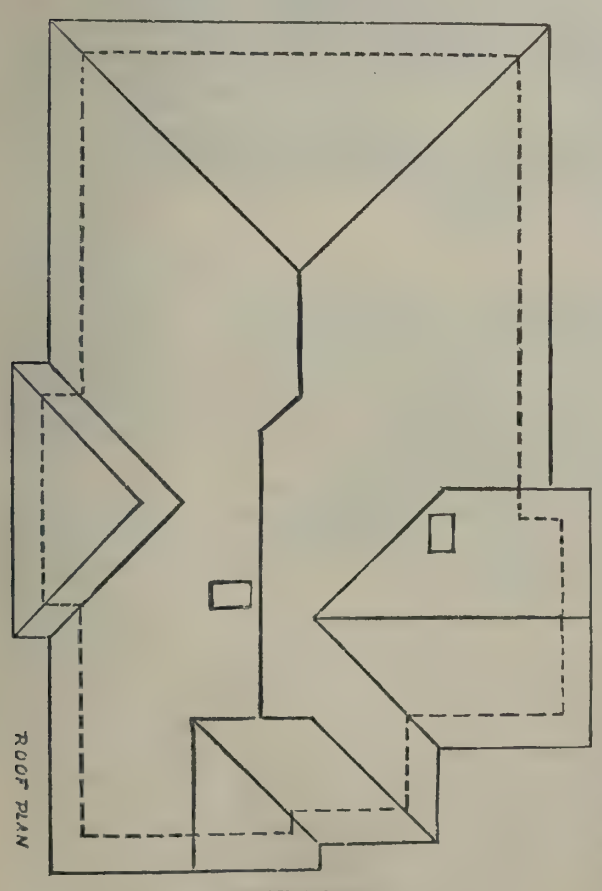


A CALIFORNIA HOUSE FOR $2,500.

On opposite side of hall from bath room is a room designated as breakfast room, in size 10×11 feet, with two windows. This can be used as a bed room, should the dining room suffice for the needs of the occupants of the house. This room is very convenient, as it can be reached by three different ways. The next room is the kitchen, in size 10×13 feet, with plenty of light and ample means of ventilation. The place for the stove-pipe is indicated by the dotted lines leading to the dining room chimney. Should it be found more desirable to have the stove in a different position from that indicated, a patent flue can be put in, starting near the ceiling. A large pass closet, amply fitted with drawers and shelves, connects with the dining room. There is also a large pantry fitted up with bins, etc.

A stairway is shown, near breakfast room, leading to the attic. No plan is given of the latter, as the space can be divided according to the individual tastes of the parties building. The rear hall is 3 feet 6 inches wide.

The whole plan is very compact, and will bear careful study. The detail drawings, as shown, will give an adequate idea of the various finishes. Each one is distinctly marked.



ROOF PLAN.

We append a general set of specifications to aid those who may see fit to adopt the design. Should any one want a complete set, we can forward them a printed copy.

SPECIFICATIONS.

Excavations.—All rock, dirt, etc., to be cleared away from site of the building. Trenches for walls and piers to be extended down to firm and solid ground. The bank to be dug well away from the walls, and the same to be left open until the walls are well set and dry.

Drains.—To be of ironstone pipe, with cemented joints. The fall to be not less than one-fourth inch to one foot. No drains to be less than sixteen inches from surface of ground.

Brick Work.—Hard, well burned brick to be used throughout. All brick walls to be made level and straight to the proper and exact height, and to a true line from one end to the other, even to the splitting of a brick where necessary. Piers 12×12 inches. Turn trimmer arches for the support of all hearths at the time chimneys are built. All sills to be set in mortar after walls are proper height.

Size of Timbers, etc.—Main sills, 6×8 inches; plates, 2×4; studs, 2×4; underpinning, 4×6; joists, 2×10; ceiling joists 2×4; rafters, 2×4; bridging, 2×3 and 2×4. Studs and joists spaced 16 inches from center; rafters, 2 feet 8 inches from center; underpinning 2 feet 8 inches from center. All timber below main sills to be of redwood.

Roof to be sheathed with 1×6 Oregon pine, well nailed to every rafter. Gutters arranged so as to carry off water wherever directed.

Rustic.—All laps and butt joints to be painted before being nailed in position. Butt joints to have a 3×11 inch piece of tin to keep out water.

Outside Steps to be built upon strong stringers, inch risers of redwood, and two inch treads of Oregon pine, with nosing and scotia. The recess to front hall will be floored six inches below main floor, with three inch Oregon pine, put together with white lead.

Floors.—Oregon pine, tongued and grooved, 4 inches wide, to be used throughout the house. One tongue nail and one through nail to be driven in each piece at each nailing.

Grounds to be of ¾ in. Oregon pine at all openings.

No inside finish to be put on until the last coat of plastering is on.

Face casings to be 6 inches wide and 1¼ inches thick, with suitable plinths.

Sash beads to be fastened on with raised head screws.

All interior work to be hand-smoothed and sand-papered.

All carved or planted-on work to be primed before putting up.

Bases in all rooms to be 10 inches wide, with 2 inch moulding.

Wainscoting.—Rear hall, kitchen, and breakfast room to be wainscoted 3 feet high, and capped with nosing and scotia. Bath room, 6 feet high all around.

Pantry and Pass Closet to be fitted up with shelves and hooks complete, and bins and drawers as shown.

Lathing.—Good sound lath to be used, laid on not less than ⅜ of an inch apart. Joints broken over 8 laths. No lath to be put on vertically, to finish out to corners or angles; neither must there be any lath run through angles and behind studding from one room to another. All angles to be formed and nailed solid by carpenter before laths are put on.

Plastering.—All walls, partitions, and ceilings to be plastered one coat of well haired mortar, made of best lime and clean, sharp sand, free from loam and salt, using best cattle hair. To be made at least eight days before using.

Brown coat to be covered with a good coat of best white hard finish. All plastering to extend to the floor. Center pieces where designated on plans.

Painting.—All interior wood work to have three coats of best white lead, in such tints as may be approved by the owner. Kitchen floor to be oiled two coats.

Gas Pipes to be introduced so as to give the number of lights shown on plan.

Plumbing.—Water pipes to be of galvanized iron ¾ inch diameter. No ½ inch pipe to be used. A 40 gallon galvanized iron boiler, with necessary connections, to be placed in the kitchen. Sink to be of size shown by drawing, to have 2 inch iron water pipe and a Garland trap; 3½ inch brass strainer; back of sink to be lined with zinc. Slop hoppers to be placed as shown. Wash basins to be located as per plan, and to have all necessary hot and cold water connections. Water from all basins to discharge into an open slop hopper outside. Bath tub to be lined with No. 12 zinc, to have a 1¼ inch waste, with Garland trap. All necessary fixtures for bath tub to be placed in proper position. The water closet to be Budde's patent. Place safe trays under all sinks, bath tub, wash basins, water closets, etc., with 2 inch turned-up edges, well nailed to wood work. Three fourths inch wastes. All waste or soil pipes to be connected with the sewer, and extend the same above basins, sinks, bath tub, water closets, etc., out through the roof.

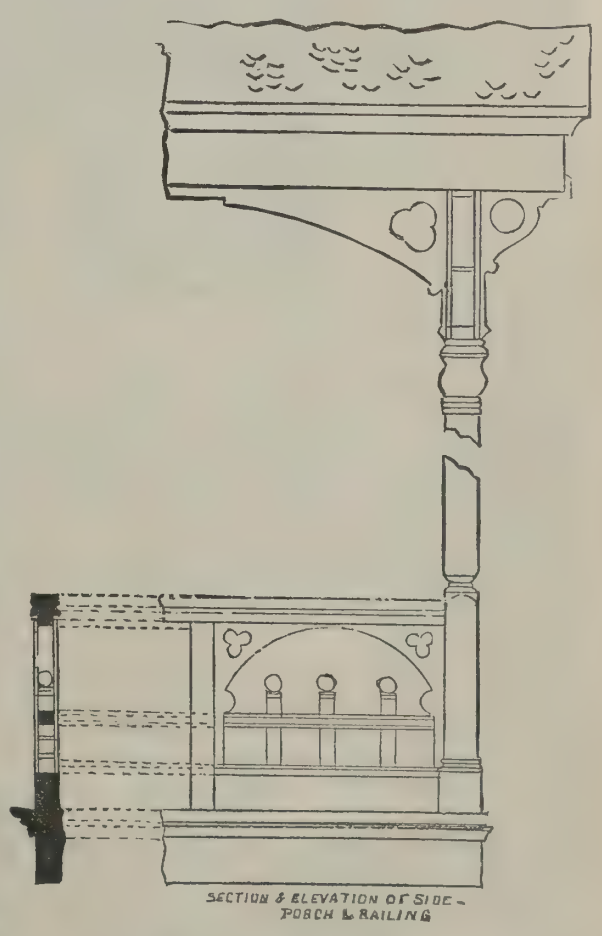
Generally.—Drawings and specifications are intended to correspond, and to be illustrative the one of the other. All drawings to be furnished by the architect. Details to be given from time to time as the work progresses. Should the necessity arise that any change or changes be made from the original design, the owner shall have the right so to do without invalidating the contract, adding to or deducting from the contract price the agreed sum of any change made.

COST.

The above specifications are given as a general in... of the work. No accurate estimate can be given from them of the cost of the house. Quality and price hardware, etc., have been omitted, leaving same to t pocket books of intending builders. As shown, with finishes indicated by the details given, the house can be erected at a cost of about $2,500. Of course this figure can be changed considerably. Using the best of materials, etc., the price should be given at $3,000, at which sum a truly cozy home can be obtained by those seeking a permanent dwelling place.—*California Architect.*

The Architectural Era.

This is the title of a new monthly published at Syracuse, N. Y. It is finely printed, handsomely illustrated, and full of interesting reading matter. It forms a valuable addition to the architectural literature of the day. The elegant style in which it is produced does honor to its enterprising publishers, Messrs. D. Mason & Co. Three dollars a year, twenty-five cents per number.



Blue Marking Ink for Boxes, Bales, etc.

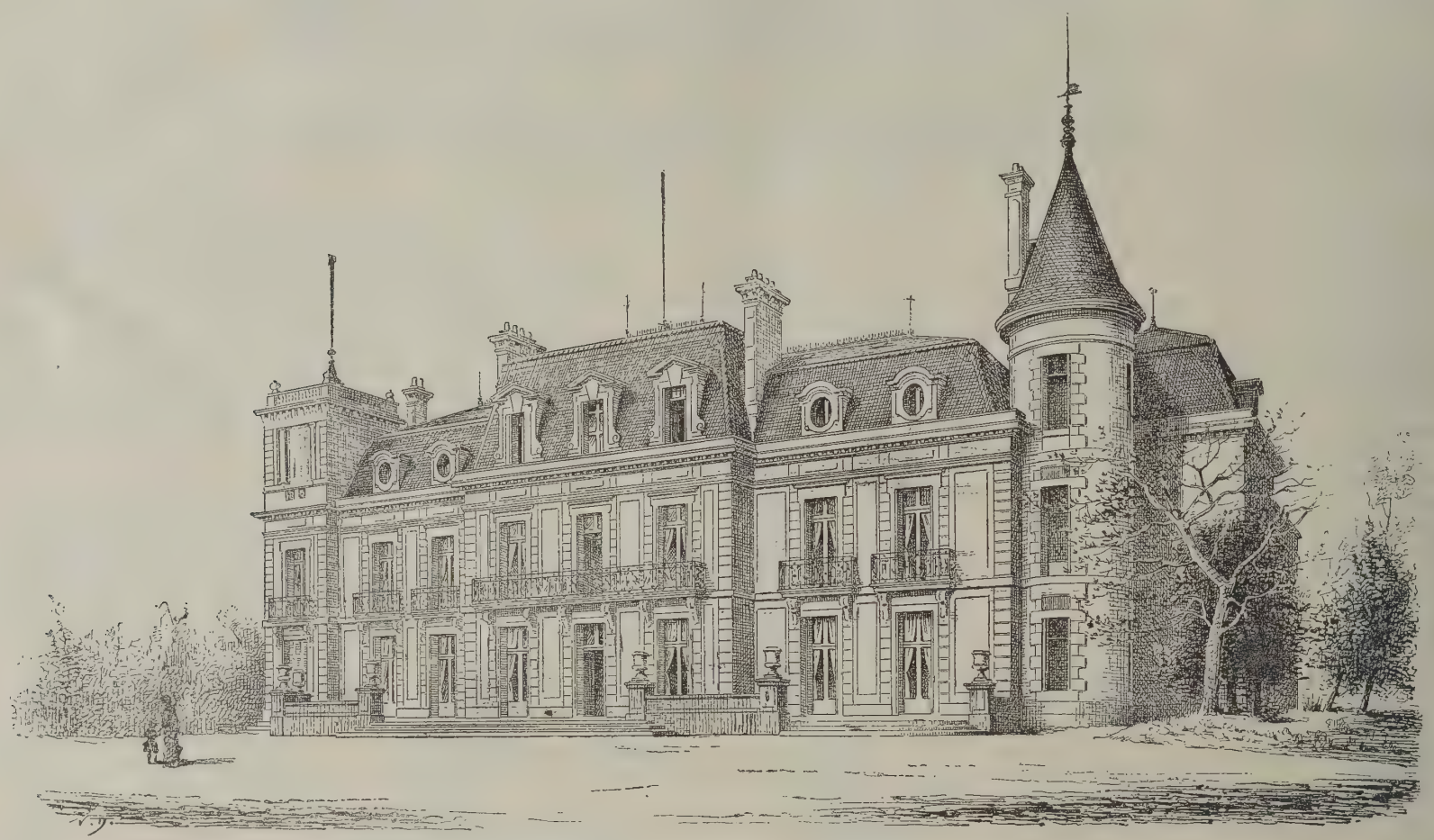
Mix a sufficient quantity of ultramarine with barytes (sulphate of barium, blanc fix) and water to produce the desired tint. It may be rendered more permanent by adding some liquid glue (solution of glue in acetic acid) or some starch paste, prepared with the addition of a little wax.—*Chem. and Drug.*

CHATEAU AT CASTELNAUDARY.

The internal decoration of the structure represented in the accompanying engravings is due to Mr. Arnaud, an architect at Carcassonne. The front already existed in part, and merely the finishing of it is due to him. As for the parlor and dining room, of which we give an illustration, these two rooms, like the rest, were studied with very artistic care by Mr. Arnaud, and the execution of the work was closely watched.

The chimney that decorates the dining room is of Echaillon stone, and was made at the works of Mr. G. Biron. It is 14 feet in height, and cost, all carved, $1,400. The flooring of the rooms is of oak, of two colors, and was put down by the house of Idrac, of Toulouse, which makes a specialty of old oak inlaid floors. The color of the old oak, introduced into the very substance of the wood, lasts an indefinite length of time. The wainscoting of the dining room and that of the parlor is of walnut, and forms a frame, in the case of the dining room, for old tapestry. In the parlor the panels are covered with large-figured cretonne.

The ceilings are of plaster, with mouldings. To that of the dining room are affixed, by invisible hooks, some old Japanese plates. These produce a very happy effect in the ceiling as a whole, and in nowise injure it. The ceilings are painted in softening tints, the principal of which are red, blue and maroon. The dining room cost, as a whole, $3,600, the old tapestry included.



CHATEAU OF CASTELNAUDARY—FRONT VIEW—M. AUBRY, ARCHITECT.

It is 24×30 feet, and the parlor is 28×37 feet.—*La Construction Moderne.*

Nails.

A test has recently been made of the relative value of wire and cut nails, with results quite at variance with generally received opinions. This test, given below, is published in a circular issued to the nail trade by the Wheeling nail manufacturers, and was made by a committee appointed by the Wheeling manufacturers, who give the following result:

	Number of nails in pound.		Pounds required to pull nails out.	
	Cut.	Wire.	Cut.	Wire.
20d	23	35	1,593	703
10d	60	86	908	315
8d	90	126	597	227
6d	160	206	383	200
4d	280	316	286	123

This test showed the relative value of a pound of each kind to be as follows:

1 lb. of 20d. cut nails equals 1·40 lb. of wire nails.
1 lb. of 10d. cut nails equals 2·01 lb. of wire nails.
1 lb. of 8d. cut nails equals 1·87 lb. of wire nails.
1 lb. of 6d. cut nails equals 1·49 lb. of wire nails.
1 lb. of 4d. cut nails equals 2·06 lb. of wire nails.

In obtaining the above results, two tests were made of the 8d. cut nail and four of the 8d. wire nail; three tests each were made of the 6d. and 4d. cut nails and 6d and 4d. wire nails, and the average is shown.

The committee report as a result of their experiments that $1 worth of cut nails will give the same service as $1.78 in wire nails, if at the same price per pound.—*Building.*

Rabbit Remedy.

A correspondent of the *Revue Horticole* states that he has been completely successful in saving both his vines and haricot beans from being totally destroyed by the rabbits which swarm in this district by using a remedy which he terms the "Bouillie bordelaise." This consists of a mixture of sulphate of copper (bluestone or blue vitriol) and fresh slaked lime, in the proportion of 3¼ lb. of the former to 4½ lb. of quicklime in twenty-one gallons of water. The bluestone is first dissolved in a bucket of water, the quicklime is then slaked, and when cool it is thrown along with the dissolved bluestone into a barrel or other vessel of sufficient size; water is then added to make up twenty-one gallons, and the whole is well stirred up. The mixture is conveniently applied with a whitewash brush, and in fine, dry weather only should it be used. The object of the lime in the mixture is to counteract any ill effects that the sulphate of copper or bluestone might have on the vegetable tissues, and also to indicate that no part of the stem or plant which it is intended to protect has been passed over without receiving its proper share of the application.

How to Build an Ice House.

Under this head the *American Architect* advises a correspondent as follows:

1. The ice house floor should be above the level of the ground, or, at least, should be sufficiently above some neighboring area to give an outfall for a drain, put in in such a way as to keep the floor clear of standing water.

2. The walls should be hollow. A four inch lining wall, tied to the outer wall with hoop iron, and with a three inch air space, would answer, but it would be better, if the air space is thoroughly drained, to fill it with mineral wool, or some similar substance, to prevent the movement of the air entangled in the fibers, and thus check the transference by convection of heat from the outside to the lining wall.

3. A roof of thick plank will keep out heat far better than one of thin boards with an air space under it.

4. Shingles will be much better for roofing than slate.

5. It is best to ventilate the upper portion of the building. If no ventilation is provided, the confined air under the roof becomes intensely heated in summer, and outlets should be provided at the highest part, with inlets at convenient points, to keep the temperature of the air over the ice at least down to that of the exterior atmosphere.

In reply to inquiries from various correspondents we would say that Messrs. Munn & Co., 361 Broadway, proprietors of this periodical, have an extensive architectural bureau connected with their establishments, and here, with the assistance of an able corps of architects, they prepare, in the best and most prompt manner, designs, plans, specifications, and details for all kinds of buildings, churches, schools, stores, dwellings, etc. Hundreds of buildings in all parts of the country have been erected from their plans. Messrs. Munn & Co. will be pleased to furnish any information desired by readers relative to any buildings illustrated in these pages.

Look to Your Drain Pipes and Wells.

The Rhode Island State board of health has completed its investigation of the epidemic of typhoid fever at Conanicut park hotel, made last summer.

At the opening of the season of 1887 trouble was experienced, but no action was taken. Soon the people in the house began to be ill, and at a time when all the rooms were taken and many more guests were to come and occupy the cottage apartments. From the first symptoms, which were not considered serious, the disease, which proved to be typhoid fever, assumed a violent form, and Dr. Jernigan, on whose advice several patients had come to the island, directed a practical plumber to make a thorough examination of the premises.

The plumber discovered that the pipes leading from the water closets had leaked into the cellar, and that from all appearances the leak had existed from the first of the season. The sewage had run into the well from which the water was drawn for general uses about the hotel. Prior to the discovery of the contamination of the water, its sparkling qualities had been praised by all the guests. The plumber also reported that the ground near the well was saturated with the sewage, and that when disturbed the earth emitted an overpowering and sickening stench. From the cellar the investigation was continued to the well at the north end of the house. It was dug quite recently, and the shaft had been sunk through an old drain leading to a cesspool, and a portion of the drain constituted a section of the well shaft.

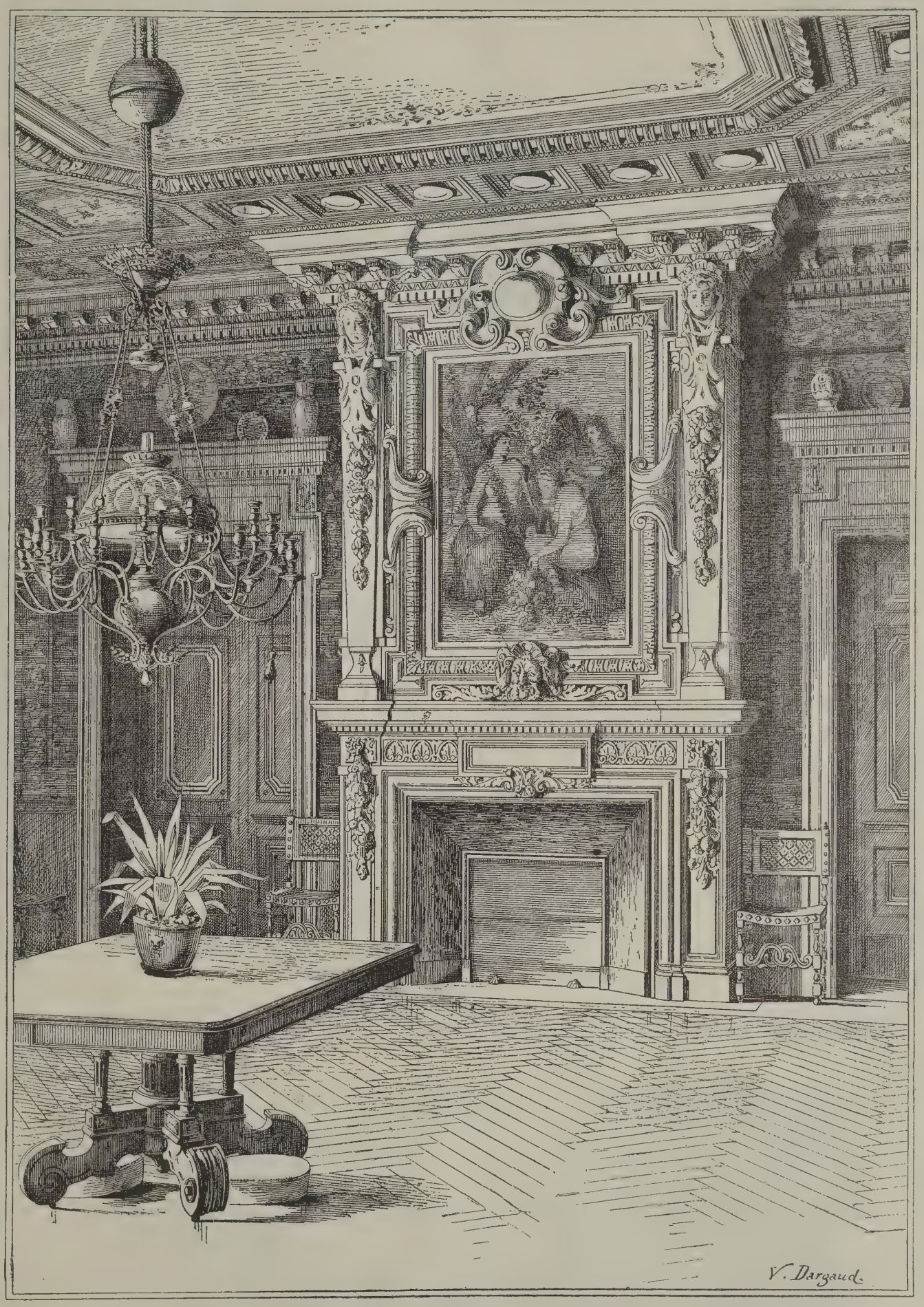
The State board of health proposes to ask for an appropriation this winter sufficient to pay for a careful examination of all the hotels in the State, and the inspection and analysis of all waters used for drinking purposes where there is liability of contamination.—*Sanitary News.*

Arch Construction.

Iron construction has so completely superseded masonry for bridge building that it would appear almost unnecessary to discuss the question of the equilibrated arch for any large span. But the mathematical principles of the arch have always been an interesting subject with geometricians and theorists, and the theory, at any rate, ought to form one of the subjects of the architect's and engineer's education. As a problem of the equilibrium of forces, the theory of arch construction is instructive, inasmuch as it presents us with a concrete example of three forces balanced in a structure.

The other day, at the opening of the engineering section of the Bristol Naturalists' Society, at University College, Bristol, the president, Mr. Charles Richardson, C.E., read a paper on arch building, in which he advocated the employment of arches of equilibrium for bridges. The author referred to the well known and elegant property of the balanced arch, which is derived from the principle of the catenary or suspended chain or inverted polygon of bars, each bar or link assuming the position (inverted) that the arch stones of an equilibrated arch would have. In Dr. Hutton's valuable "Tracts on Bridges," this principle is followed in his elucidation of the arch, and readers of that work will remember the diagrams given of various kinds of balanced arches, and the curves of extrados necessary to insure equilibrium. The theory, indeed, is older than Hutton. Belidor and Dr. Hooke both investigated the form of the extrados from the nature of the curve, and this theory has been made the foundation of a very interesting system of designing arches. According to this theory of the question, the stones are considered free from all friction—a condition which does not hold in practice. Mr. Richardson follows, as far as we can see, this theory. He enunciated the theorem that the weight on any point of the arch is proportional to the vertical line from the road line to the intrados at that point; that the horizontal thrust is the same throughout the arch, and is equal to the weight on the crown per unit of area multiplied by the radius of curvature there; and also that the bed pressure at any point is equal to the horizontal thrust multiplied by the secant of the angle the curve makes with the horizon at that point. This rule is thoroughly mathematical and true for arches of equilibrium; and the author exhibited an instructive model of an arch equilibrated, and showed by inverting it, and suspending a chain weighted by steel rods representing the loads at each point, that the latter coincided with the road line. But the engineer-architect has to do with arches in which the element of friction enters; the stones are cemented, and therefore the theory, however beautiful, does not hold good in every case. Instead of the separate arch stones or voussoirs, he has to deal with segments of the arch which turn upon certain edges. Thus an arch which fails breaks into four parts, the crown sinks, and the haunches rise, the joints at those points opening. One of the questions to decide is the points at which rupture occurs, that being found to find out what horizontal pressure each of those lower segments have to sustain. From knowing the thrust and its point of action, the stability of the arch will depend on the mass and weight of the pier. The experiments of Rondelet and others have proved that the voussoirs unite into segments of the arch, and tend to overturn the abutment, acting rather as levers than wedges. He found, also, that the greatest thrust was in arches with an even number of voussoirs or a point at the vertex; that a keystone lessened the thrust. Nevertheless, the theory of equilibration should be known by all architects and bridge builders.

In alluding to the materials, the author showed the impossibility of dressing and bedding stones accurately. Practically, the stone built arch is difficult to execute with precision. The facing stones only are cut to the true curve, the backing being filled in with rubble and roughly executed. With brickwork the bricks can be all bedded in cement, being more convenient for handling, and a vitrified brick is equal at least to the best stone in resistance. The brick arch should be built in vertical bond, not in rings Mr. Richardson finds that, taking the safe load in cement at 5 cwt. upon the square inch, an arch 15 in. thick at the springing and 12⅝ at the crown is sufficient for a span of 85 feet with a rise of ⅛ of the span. He says: "As all loads and thrusts on such an arch are in direct proportion, if each dimension were multiplied by four, we should have a span of 340 feet with a rise of 42 feet and an arch thickness of 5 feet. This 5 feet thickness would give a sufficient margin of safety for the moving load, because 5 feet is only the necessary thickness at the springing, while that at the crown would be 9 in. less. The total weight of this bridge would be 100,000 tons." Ring-built arches are advisedly objected to, as the rings tend to separate when any settlement takes place. Mr. Richardson does not rely too much on friction, and he is right. There can be no scientific construction that is not based on the principle of equilibrium, the line of thrust being kept within the middle third of the arch thickness; and in designing arches of brick or stone the engineer should always be able by diagram to satisfy himself of this condition. Whenever the line of thrust passes close to the lower edge of the arch ring at the haunches, there must be undue pressure and a tendency to open at the other edge. In other words, the arch is inclined to drop at the crown. When it passes out of the arch, failure must take place sooner or later. Instead of first deciding upon the curve and road line, as is frequently done, the right course is to find the line of thrust for the given span and loading, and then make the arch conform as nearly as possible to this line. We agree with the opinion that brickwork, if correctly applied, would be found to excel iron construction in strength, durability, and economy—certainly in appearance. In the construction of masonry arches, sufficient care is not always bestowed upon the drainage of the arches—a cause, we imagine, of many failures.—*Building News.*



INTERIOR OF CASTELNAUDARY CHATEAU.

GILBERT SHEFFIELD, a Warren County, N. Y., lumberman, is one of the men who believes in using his men well, and in doing something to relieve the tedium of life in the woods. He has 35 men employed at Tahawus, in Essex County, and says that for the past two years it has been his practice to furnish them with copies of the prominent newspapers, so that when they left camp they were as well informed regarding current events as when they went in.

NEW FORM OF CHIMES FOR CHURCHES.

A new form of chimes for churches is being introduced in England, which are said to give much satisfaction. They consist of a series of metallic tubes suspended from a beam, as shown in our engraving. They are struck by hammers, are very resonant, loud, and pleasing. A correspondent of the *Pall Mall Gazette*, speaking of their effect, says: "The music of many tuneful bells, harmonious, ever changing, lending themselves to any simple air, easy of management, and mellowed as the sound of cathedral bells. . . . Such music I have heard at Coventry."

THE NEW TUBE CHIMES.

Tube Chimes.

The new invention which goes under the name of tube chimes is a musical chime in which metal tubes instead of bells are employed. The tube chimes can be used for any purpose that bells are used for, and besides are an economical substitute for bells. They are remarkable also for a depth and richness of tone which one does not expect to find except in high class cathedral bells. A tube chime for a church belfry is especially suitable. The carrying power is not quite equal to that of bells. A chime was lately set up in the tower of one of the Dorsetshire churches which has pleased all concerned. Rung for the first time on occasion of the harvest festival, it caused both delight and surprise by the sweet and melodious tones it gave out. The invention has not long been brought under public notice, but the demand for household octaves in place of the inharmonious gong is already very large. Mr. Harrington has a taste for music, and the idea of adapting tubes of metal for the musical purposes of bells is no new one. It has taken, though, many years of experiment and study to perfect the principle. One difficulty, which was a great obstacle in the way, may be alluded to. The large chimes are rung by bell ropes, but, contrary to the plan of bells, there is an external hammer instead of the internal clapper. If the hammers were made of sufficient hardness to prevent wear and tear, the chime lost its sweet tones and became harsh. If the hammers were less hard, they would constantly require to be replaced. Fortunately, that difficulty, like many others, has been satisfactorily got over. The chimes can be, it should be noted, tuned to any desired pitch, and Messrs. Harrington & Co. are probably warranted when they say: "The introduction of this invention will, we are assured, mark the commencement of a new era in connection with church bells and carillons, chimes for clocks of all sizes, dinner calls and gongs, and all mechanisms in which musical bells are used or required, and in some of these departments bids fair to work a complete revolution."—*The Architect.*

MISS FLORENCE NIGHTINGALE'S HOME.

At the residence of Sir Harry Verney, Claydon House, Buckinghamshire, a deputation from the Working Men's Club of Whatstandwell, Derbyshire, recently waited on Miss Florence Nightingale, for the purpose of presenting to her an oil painting, by Mr. E. Crosland, of her late home, Lea Hurst, as a token of their esteem, and in recognition of the great interest taken by her in that institution. The deputation, consisting of Mr. F. C. Iveson, Mr. Crosland, the artist, and Mr. W. Peacock, assured Miss Nightingale of the love felt for her by all classes of people at Whatstandwell and in that district, and of their gratitude for her kindness and help in every good work. Miss Nightingale, in thanking them for the present, which she admired very much, expressed her continued great interest in the institution and its members, and assured them of her hopes for its welfare. The deputation were entertained at Claydon House by Sir Harry and Lady Verney. We are permitted to copy the picture of Lea Hurst in our engraving, using a photograph taken by Mr. J. Schmidt, of Belper.

Miss Florence Nightingale is a lady whose name has been deservedly honored in England since the Crimean war and has become the symbol of a particular type of personal efforts in the service of afflicted humanity. She was born at Florence, in May, 1820, youngest daughter and coheiress of W. E. Nightingale, Esq., of Lea Hurst, Derbyshire, and Embley Park, Hampshire. She devoted her attention to the working of schools for the poor, juvenile reformatories, and hospitals, inspecting many such institutions on the Continent, and residing, in 1851, with the Protestant Sisters of Mercy at Kaiserswerth, on the Rhine. She next bestowed her care and gifts of her money on the London Governesses' Sanatorium in Harley street. During the Crimean war, in 1854, when the inefficient state of our military hospitals in the East demanded instant reform, the hospital at Scutari, opposite Constantinople, was established for the relief of sick and wounded British soldiers and prisoners. It was resolved to form a select band of volunteer lady superintendents and female nurses for this and other army hospitals. At the request of the Secretary of State for the War Department, Mr. Sidney Herbert, afterward Lord Herbert of Lea, Miss Nightingale undertook the task of organizing and directing this service, which she performed in a manner universally admired, and which earned her the personal friendship of the Queen, with many public and private expressions of gratitude and esteem. A testimonial fund amounting to $250,000 was subscribed in recognition of her patriotic and benevolent work, and was, at her special desire, applied to create and maintain an institution for the training of nurses Miss Nightingale's impaired health, for many years past, has debarred her from active public exertions but she has continued to study the plans and operations of those charitable agencies on which she is a high authority, and has written brief treatises on subjects of much practical importance. Her "Notes on Hospitals," printed in 1859; "Notes on Nursing," in 1860; and "Notes on Lying-in Institutions," and on the training of midwives and midwifery nurses, in 1871, were of considerable utility. She also wrote, in 1863, valuable observations on the sanitary condition of the army in India, and has furnished to the War Office useful reports and suggestions concerning the army medical department.—*Illustrated London News.*

LEA HURST, DERBYSHIRE, THE HOME OF MISS FLORENCE NIGHTINGALE.

Painting.

In order to use paints and oils economically, a clear understanding of their purpose and action is absolutely necessary. Linseed oil is said to "dry" after being applied. That is only partially true. It rather oxidizes and changes to a tough, gummy substance not unlike hard glue. This action is accelerated by the use of "driers," as they are called. But in no case does it give the same results as when left to dry of its own free will. The carbonate of lead or mineral which is added to the oil gives the color and assists in making up the body. The life of the paint is the oil, and when it is oxidized, it alone is the binding element. Upon it depends the durability of the paint. A piece of wood dipped in linseed oil and hung up to dry, or oxidize, in the air, will soon become covered with a beautiful translucent film of oxidized oil, which grows harder daily. It will take a high polish and preserve the wood. Another piece dipped in carbonate of lead, or mineral, mixed in turpentine, or any fluid to allow it to spread evenly over the surface, will when dry have a dead or flat color without polish or body to bind it together, and the slightest abrasion will remove portions of it. All painting is done either with pure oils or with the admixture of a fluid like turpentine, which assists in the distribution of the mineral, but does not add to the body. When the surface of wood has been covered with a thick coating of oxidized oil, it can be washed and rubbed to look clean and polished. Boats, when of a light color, are often painted with a mixture containing much turpentine, in order that all marks may be removed with a little beach sand, by rubbing off the mineral, which is not bound together securely by oil, but only loosely by turpentine. Car builders now often paint their cars or varnish them a second time soon after the first, say after about six months' run. This gives them a good coat of oxidized oil to withstand the weather and preserve the wood. A few coats applied within short intervals produce a fine covering which is very durable and will take a polish after washing.—*Master Mechanic.*

Removal of Chimneys.

An interesting scene was caused recently by the blowing up of the two immense chimneys on Borsig's machine works in Berlin. A large number of spectators were present to witness the ceremony, including several officers of the army, the trustees of the Borsig estates, and the employes of the works. Punctually at five minutes past six P. M., the signal to "Look out!" was given; then came the word of command, "Fire!" and at this moment the vast chimney, towering to a height of say 120 feet 9 inches, quietly collapsed The noise occasioned by the fall was not very great, ditches two meters in breadth having been dug all round the chimney and filled with straw. For blowing up this colossus, which consisted of 98,000 bricks and was topped with a heavy iron cap weighing twenty-five centners, only 24 kilos of dynamite were employed. Photographs were taken of the chimney before it fell, and also as it was in the act of falling, by an officer of the Commission for Experimenting with Explosives. The second chimney, standing about 80 feet high, was blasted with gun cotton, of which 35 kilos were required.

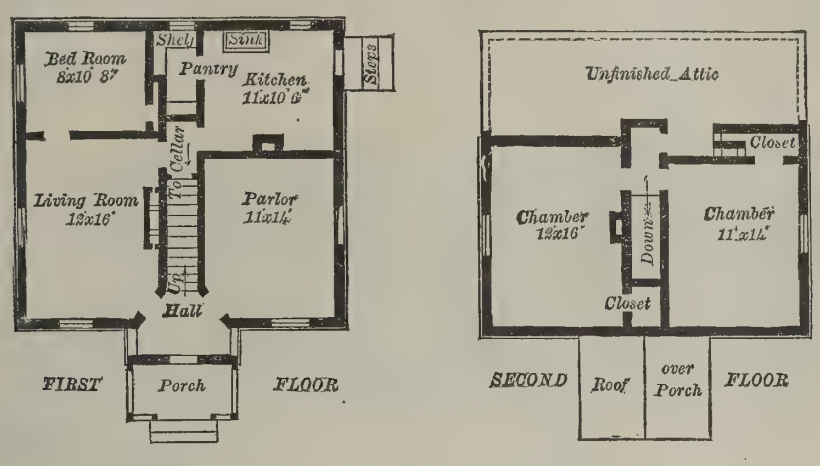
HOMES OF FACTORY OPERATIVES.

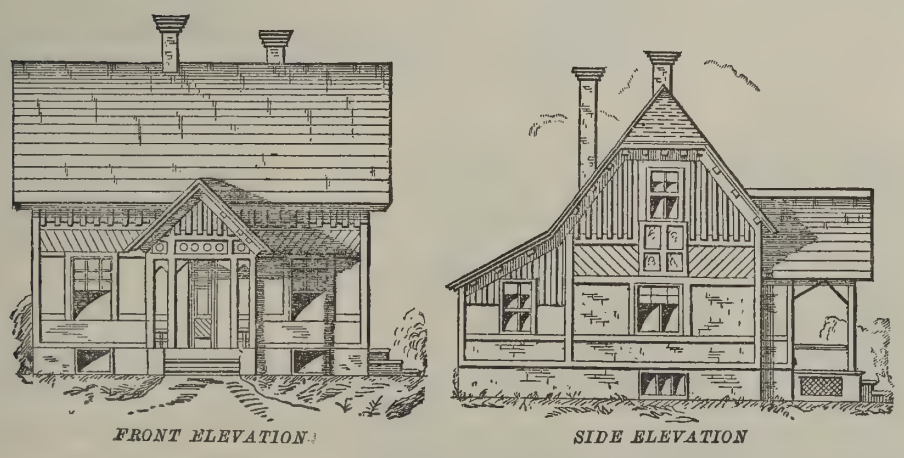
The institution of the factory system changed the workshop home of the domestic system to the home proper by transferring work to the factory. As a result, the homes of the operatives under the factory system have undergone a great change, and are still undergoing changes, which are making the English significance of the word "home" a reality to the poorest. It is perfectly true that in every large factory town one can find loathsome dwellings occupied by groups of persons called families. In most factory towns, both in America and Europe, it is easy to find dwellings occupied by factory operatives which are a disgrace to the owners and the municipality. Yet, taking the operative population of such towns as a class, they are very comfortably housed, and about as well housed in one country as another. The personal inspection of more than 1,000 homes of factory operatives leads Mr. Carroll D. Wright to this conclusion, he having written a special report on the "Factory System of the United States" for the Census Bureau.

British factory houses being floored with stone, as a rule, present a cold and cheerless look. The dimensions of the British house are much smaller than factory houses in America. The tenements of three rooms have much less space than tenements of three rooms here. This is generally true of all European factory towns. But the houses of the operatives are, as a rule, separate ones, the tenement house being quite unknown except where what is termed the "model workingmen's houses" are being tried. The boarding house is not an institution for factory operatives.

Prussia. By his system of employment he has the selection of the best mechanics in Europe. This system comprehends all the advantages to be found in model industrial establishments, including excellent tenements and gardens at low rents. A foreman, a gunmaker, earning $45 per month, receives four rooms, a drying place on the roof, a cellar, and a garden for $45 per year. A workman with wages at 75 cents per day pays $37 per year for three large rooms, drying place, cellar, and garden. The reare fair tenements, in two or three story blocks, situated in colonies just outside the towns. For $100 per year, one can obtain a most excellent tenement of seven large rooms, cellar, garden, etc. The houses in the colonies are owned by Herr Krupp. In fact, he believes that he receives better results by owning everything, and by being able thereby to control the sanitary surroundings of the dwellings of his people. These colonies, each having its name, are laid out with park, schools, churches, supply stores, etc. The housing of the single men is on the barrack plan.

It may be stated that the houses in Great Britain and on the Continent are of stone or brick, as the locality may afford, and the neat wood cottage of America cannot be found. It is quite impossible to compare the houses of European factory operatives with those of the same class in America. The great mass of the former are, generally speaking, quite as well housed as the latter, so far as the quality of the house is concerned; but so far as quantity of room and excellence of living are concerned, the advantage is with the operatives of America. When the operative of this country steps





OPERATIVE'S HOUSE AT WILLIMANTIC FACTORIES.

At Saltaire, near Bradford, the homes of the workpeople are excellent; rents vary from $30 to $100 per year for three to five room houses. The houses are neat, tidy, and prettily furnished. At Queensbury, where John Foster & Son have works, the weavers earn 15 to 18 shillings per week full run, and the rents are 84 cents per week for three rooms. Some of the best houses in England are at Copley village, in Halifax, built by James Akroyd & Sons. They rent three rooms for £10 per year, and the operatives are helped to acquire a freehold. The Crowleys at Halifax employ 5,000 people, who have good houses. The houses at Salford and Manchester are not so good. The factories at Paisley are excellent evidences of the good influence which arises from proper interest in employes. The works of the Messrs. Clark and Messrs. Coates are model establishments and the influence of model works extends to the houses of the people employed, which are here very comfortable. Rents vary from 72 cents to $2 per week, according to number of rooms.

In Glasgow no cellarages can now be found. The operatives have gone to the suburbs, where they have changed their cramped city abodes for clean and light houses. Belfast, Ireland, is improving the dwellings of the linen factory operatives. The houses are tidy, and rents are from 48 to 60 cents per week for four rooms. There are houses with flats in Belfast. In the west and east of Scotland the operatives live very largely in flats; rents in Dundee and Dunfermline being for two rooms from $15 to $30 per year, and for three or four rooms from $30 to $50 per year

Among the most substantial houses for workingmen will be found those of Herr Krupp, in Essen, Rhenish

out of the boarding or the tenement house, he steps into an individual home the equal of which cannot be found in the factory towns of the Old World.

The cottage of the American factory operative, when he sees fit to occupy one, is superior to the cottage of the workingman of any other country. It is most gratifying to know that the individual homes are not only increasing in number in this country, but they are increasing in influence. In all the leading factory towns this is the course of progress.

The plates we give on this page represent one of the styles of modern cottages built by the Willimantic Linen Co., of Willimantic, Conn. With each cottage is quite a garden of several thousand feet of land. The rent is from $60 to $125 per year. These houses are located in such a way as to exhibit variety of styles; that is, two of like architecture are never placed side by side. The company has a large number of these houses occupied by operators and overseers. The cuts show the front and side elevations, and the plans of the two floors. These are given as a type of the detached workingmen's homes used in this country.—*Min. and Sci. Press.*

Gangways v. Staircases.

Mr. A. Lindsay Miller, in the *Building News*, recommends for theaters and other public buildings the use of gangways instead of stairs.

In public works, especially dye works, they will not use the stairs, but gain access to the several floors by gangways, with a rise of about 5 ft. in 12 ft or 13 ft. of length, and any one watching the speed and ease with which the workers run from floor to floor would at once understand why staircases are not used. Of course, architecturally, they have not the dignity of the staircase; but, in theaters and music halls, dignity is secondary to security. The advantage of the gangway is easily explained.

In going down a stair, each step, or, in a hurry, each second step, must be taken, and the slightest mistake throws the person down. In a stair 12 ft. long, at least six different steps require to be taken. In the gangway of the same length, a person in a hurry, or in the excitement of a panic, would take it in two bounds, and with perfect safety.

ROBURITE—A NEW EXPLOSIVE.

A number of experiments were conducted lately at the works of Messrs. Heenan & Froude, Manchester, with a new explosive, called "roburite," which is manufactured in Germany, and is about to be introduced into this country for use in blasting operations. The composition and process of manufacture of this explosive are kept secret, but we understand that it consists of two non-explosive and perfectly harmless substances, of such a nature that they may be stored or transported without special precautions or restrictions. These two substances may be mixed together when required, and, in combination, become roburite, a yellowish compound, which will bear rough handling with safety. We understand that an intense heat is necessary to explode it. In order to prove this, the explosive was placed, in the experiments in question, between two plates, which were freely rubbed together and hammered; and a small quantity thrown upon a fire was merely consumed, without exploding.

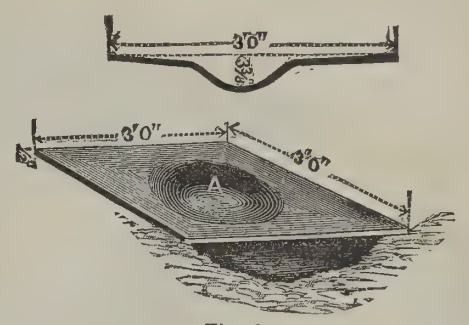


Fig. 1.

In order to obtain an idea of the explosive effectiveness of roburite, eight ounces of the explosive were placed on a plate of the very best steel, at the point marked A in Fig. 1, which shows the state of the plate after the explosion. This plate was 3 ft. square by ½ in. thick, and a bulge of about 1 ft. diam. and 3½ in. deep was caused by the explosion. Twelve ounces of the explosive were then placed at A (Fig. 2) on a cast iron plate, 6 in. thick, and weighing nearly three tons. After the explosion the plate was found to be broken transversely, in the manner shown in the engraving.

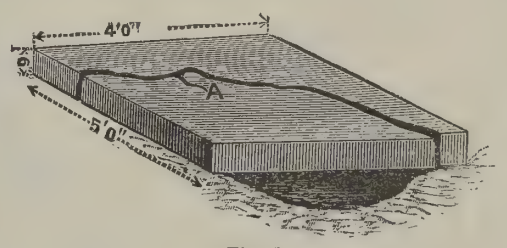


Fig. 2.

Unlike dynamite, roburite is said to be in no way affected by varying temperatures, and if duly protected against damp, it may be kept for years in any climate, without its efficiency becoming in any way impaired. It is also claimed by the manufacturers that roburite has an explosive force greater than dynamite by at least 25 per cent.

In exploding, roburite does not produce noxious gases, and, therefore, may be used without intermission, while the poisonous gases given off by dynamite often necessitate the stoppage of work, in some cases for a considerable time. This new explosive is applicable for use in mines and quarries, and for torpedoes and blasting operations generally.—*Industries.*

Iron Beams in Place of Wood.

Speaking of the large apartment house in New York lately condemned for dry rot (see illustration last November number of this paper), the *American Architect* says: A few of the floors were of spruce, and these, as might be expected, had resisted the rot much better than the hemlock, and were still sound, but the construction ought certainly to be changed. In view of the dangers from this source which attend efforts to provide fire-resisting floors of wood, it would seem that something might be done with light shapes of rolled iron beams. We have seen rolled floor beams used in Paris nearly as light as wooden ones of the same depth, and a tier of these, deafened with mortar on wire in the French manner, and wire-lathed underneath, with a wooden floor over, would cost little more than a solid mass of wooden beams, and would be proof against rot as well as fire.

BATHING ESTABLISHMENT AND CASINO IN VITTEL (VOSGES). BUILT BY CHARLES GARNIER, ARCHITECT, OF PARIS.

The casino is built of plastered quarry stone, with the exception of the socle, the balustrades, and the pillars, which consist of gray Vosges sandstone. The facade is ornamented with mosaics, and the roof is covered with slate of two colors.

The bathing establishment is colored in Moorish style. Red brick bands in the socle, as well as the faience and mosiacs in the main cornice, stand out artistically from the gray plaster of the walls. The roof is covered with red tiles.—*Architektonische Rundschau.*

The Back Yard.

Our immediate ancestors had their farm house, with its necessary accompaniment of granaries, barn, etc We move to town and build our shingle palace or brick mansion, with its large front show window, in which the well preserved, gilt edged family Bible and the Rogers group have it which and t'other for supremacy—and set up in our back yard, to represent the outbuildings of our ancestry, a privy, a pile of slabwood, generally as dumped, a few barrels, perhaps a cheap stable. Not then satisfied with the amount of decaying wood about the premises, we lay a lot of wood walk.

but are rather pleasing, indicating thrift, tidiness, and comfort. But when we consider the opportunities they offer for the support of the vine morning glories, sweet peas, nasturtiums, climbing roses, and like forms of plant life, what a joyous recompense for so little labor and care. Then all the available back yard space that is not used for walks, drives, etc., should give either vegetables or flowers - minister to the comfort or culture of the family.

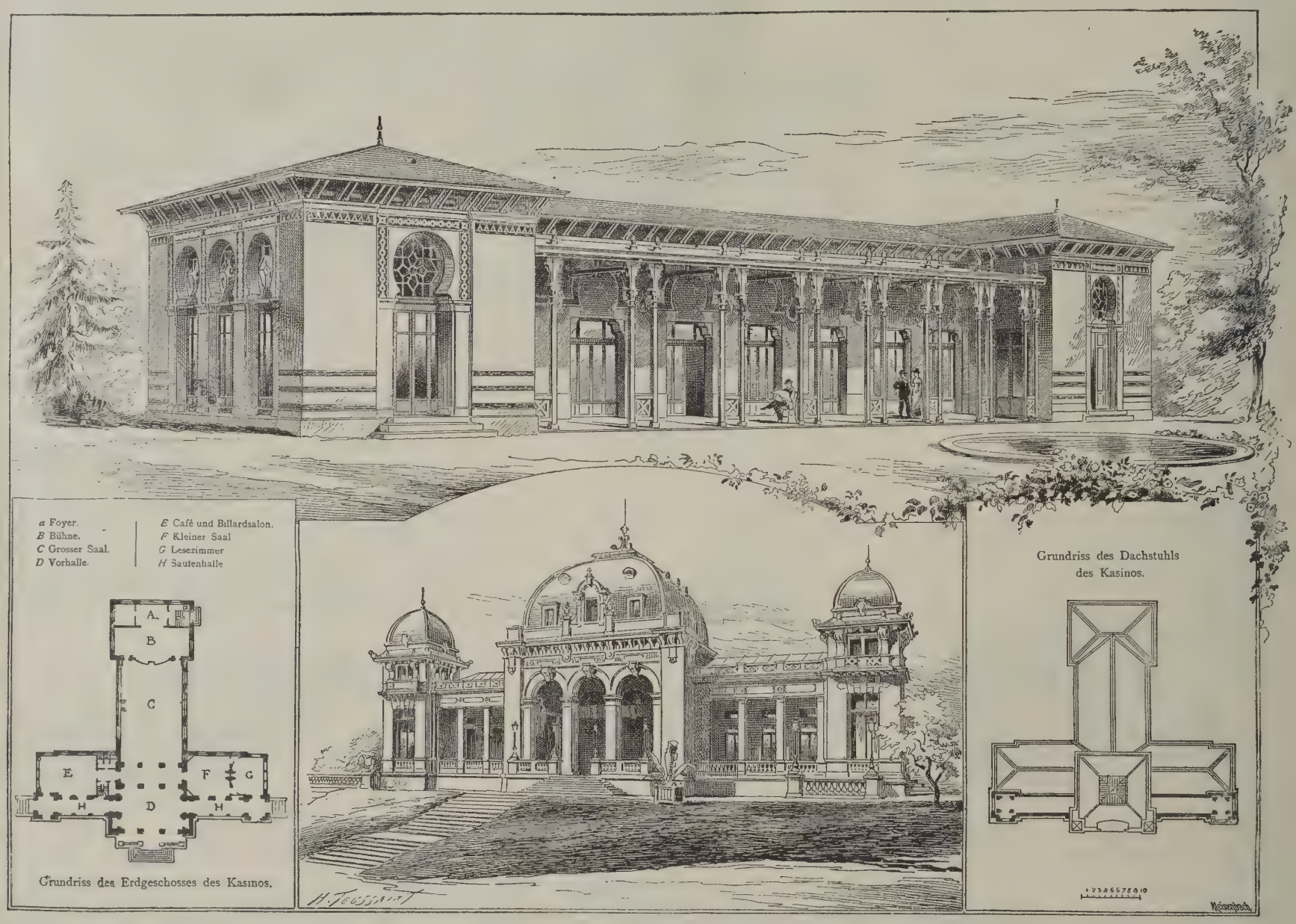
Listen to people who lament the bad influences of street associations upon the children. Yet they say, very reasonably, the children must have outdoor air, etc., and they have never considered but that the only alternative from the housing of the children is the freedom of the streets. They do not know what moral education is contained in a few feet of ground, congenial work for the hands, and the prettiest of life development studies for the mind. Give each of these street-loving children a flower bed, a small set of garden tools, some flower seeds, and what help and advice they need, and note if there be not germs of nobler thoughts and desires taking root at the same time in their fertile natures. But—to moralize a little—there is a kinship between the ornamented front and disgraceful rear of a residence and the fine clothes and the false heart of the wearer, and we fear that the majority of people who inhabit that sort of residence would rather risk some contamination of their children's characters than to see their faces, hands, and clothes besmeared with Mother Earth.

The back yard of the future will be a bower of flowers and greenery and the leisure hour resort of the family.—*N. W. Architect.*

Pine Woods.

The sights and sounds of pine woods, the comfort and delight of walking in them, cannot be half told in a short paragraph. They are also as sanitary as they are pleasing and beautiful. It is said that the air of the Black Forest does more to revive and cure weakly patients than gallons of medicine; and from experience of the odors of pines at night, or in the early morning and dewy eve, I should say they were not only antiseptic, but strengthening as a dose of quinine. The living leaves, as well as the dead and slowly decomposing needles, redolent of healing and strengthening odors, bring back the color to pale cheeks and strength to semi-exhausted constitutions.

The shelter of pine forests is also perfect. No matter how the wind thunders and roars among the tops, calm prevails on the surface of the ground. Just as the waves of the ocean are, after all, limited to its surface while a perpetual calm rests on its deeper depths, so the turmoil of the storm exhausts its force on the tops of the trees, while the base of the boles are hardly moved by it. Hence the superlative value of pines in masses for shelter. The shelter of a large pine wood is unique in character, providing a local atmosphere as genial as it is pleasant. The elasticity of the dead needles seems to get into one's spirits, and enables one for the nonce to bid adieu to the cares and the ills of life. One saunters along under the shadow of tall pines without fatigue, and can rest on the clean, sweet carpet of dead needles and leaves with little fear of noxious weeds, insects, or malaria; and the whole air is deodorized and charged to the full with health-giving properties by the odor-distributing pines, that not only provide warmth and shelter, but health, to all who walk under or linger among them. Pine woods in England are mostly too small to furnish to the full all these advantages; but the black forests of Scotland, Germany, Denmark, Sweden, and Russia are massive enough to furnish shelter, shadow, rest, and health to those wise enough to seek for either amid their grand trunks or under their dense, dark masses of branches and leaves. —*The Garden.*



BATHING HOUSE AND SALOON AT VITTEL—CHARLES GARNIER, ARCHITECT.

Thomas Ustick Walter.

Thomas Ustick Walter died at his home, in Philadelphia, on October 30, aged eighty-four years. He had been for some years president of the American Institute of Architects.

His first principal work was the new county prison, in 1831, now generally known as "Moyamensing Jail." In 1833 he made the original designs for Girard College, and was sent to Europe by the building committee of the institution. His tour through the principal countries was made for the specific purpose of the study of the principal buildings of the old world. Upon his return he took charge of the college buildings, which were finished in 1847, in accordance with his suggestions, when he was also made one of the directors of the college.

Mr. Walter's next great public work was the breakwater at Laguayra for the Venezuelan government. In 1851 his design for the extension of the national capitol was adopted, and he was appointed government architect. He removed to Washington, where he designed several prominent public buildings, among them being the wing added to the Patent Office in 1851, the reconstruction of the Congressional Library building, which was destroyed by fire in 1851, the extensions of the United States Treasury building in 1855, and the Post Office in the same year, the dome of the national capitol, and the government hospital for the insane.

SKETCH FOR A COTTAGE.

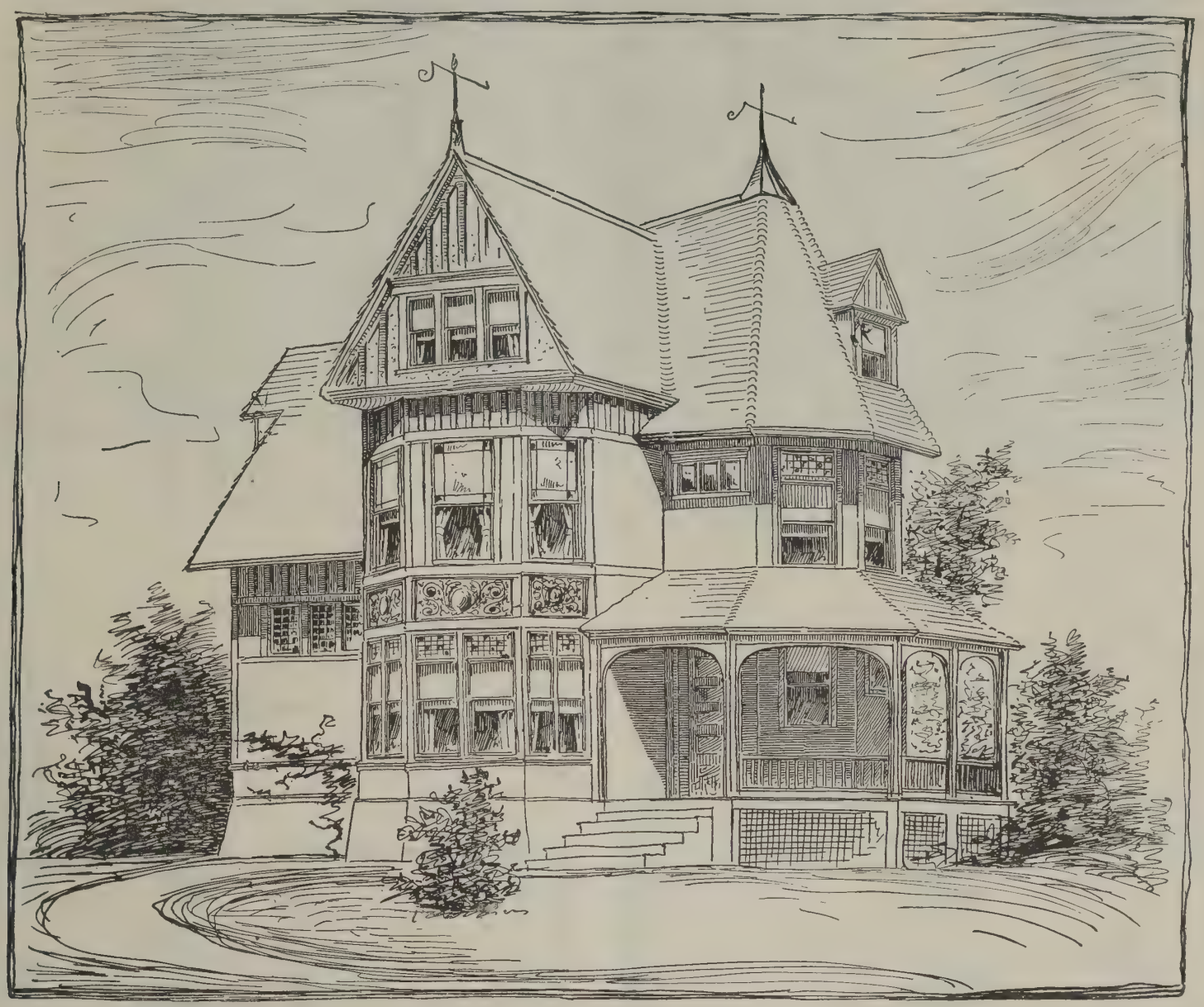
We give from the *Architectural Era* the floor plans and perspective sketch for a cottage which presents a number of attractive features. This house might be well built for $5,500, and perhaps less, depending on the locality and style of interior finish.

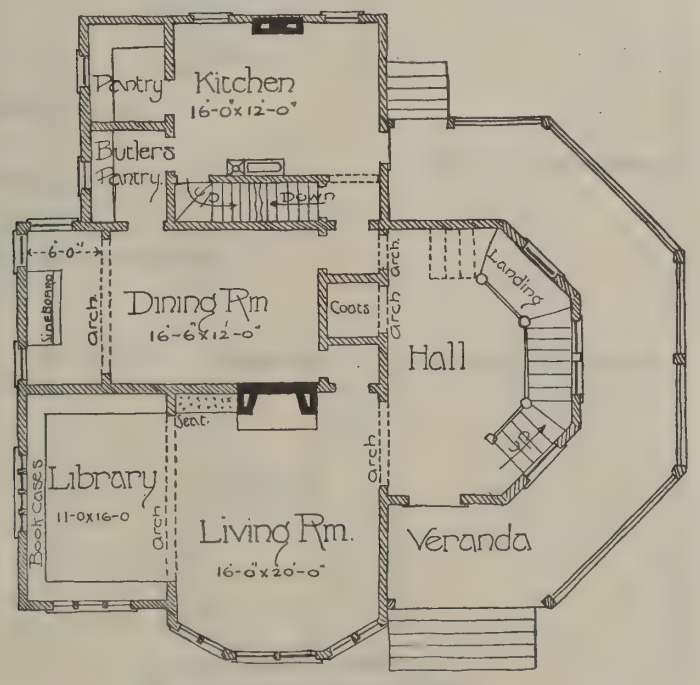
How We Have Grown.

When the history of the past seven years comes to be written, they will stand as years of the most marvelous expansion ever known in our history. Two of them, 1884 and 1885, were held as they passed to be dull years, but even these included great growth, and were a period of industrial readjustment rather than liquidation. The population of this country has not increased more than a fourth since the census of 1880, but house building, as an industry, has more than doubled, the number of common brick made in this country having increased from 3,800,000,000 to 7,000,000,000, worth $49,000,000. As the lumber trade has increased in less but large proportion, and iron production has risen over one-half from 4,300,000 tons in 1880 to 6,300,000 in 1886, it is certain that the past seven years have seen the most active building ever known in this country. Chicago uses one-seventeenth of the brick made in the country, and if its building represents the same share of the cost of house erection of all sorts in the United States, fully $2,000,000,000 have been spent on buildings in this country in the last seven years. As about the same sum will be reached by adding the building in the leading cities and estimating for the rest of the country, the truth is probably not far from these figures, which are under rather than over the mark. The railroad building since 1880 has cost, at $50,000 a mile, $2,700,000,000. This makes $4,700,000,000, or about one-tenth of the national wealth in 1880, turned into railroads and buildings in this country. As the residence and business [real estate of the country, including water power, was valued in the census of 1880 at $9,881,000,000, and the railroads at $5,500,000,000, we have added one-half to the cost of the latter and one-fifth to the former in seven years, although the railroads represent the accumulated construction of fifty years, and the buildings are spread over an even longer period in their erection. This enormous increase has taken place without adding a bale to the cotton to be carried or a bushel to the grain raised. No more pork is produced now than in 1880, and the number of sheep is no greater now than then. Great increase has been made in cattle raised for food, in fruits, and, on the average, in canned goods. Coal, taking bituminous and anthracite together, has increased one-half from 70,000,000 to 106,000,000 tons. Copper has advanced in output from 27,009 tons in 1880 to 69,800 in 1886, and about the same this year. A great advance is true of nearly all mineral products, but in agriculture the United States has made little or no progress in product in the last seven years, but a great advance in acreage or the cost of cultivation.—*Philadelphia Press.*

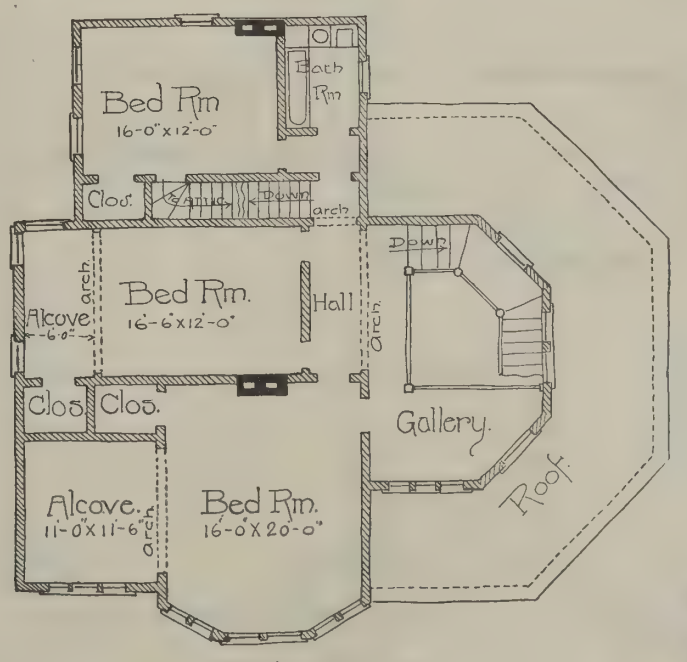
A Good Suggestion.

Charles Hardy, in the *National Builder*, says: Underestimating means working for nothing and forcing others to do the same; it means impoverishment and poor work. The contractor has himself and his family to maintain, and the temptation is great to get out by doing poor work. I would suggest that every contractor purchase an account book large enough to enter, line by line, upon a single page, every item of his estimate—giving quantity, price, and labor for each item. Let him leave opposite to this page a blank page, on which he may enter, on the corresponding line opposite, the actual amount of labor expended upon the item, and he will thus be able to see the result of his contract.





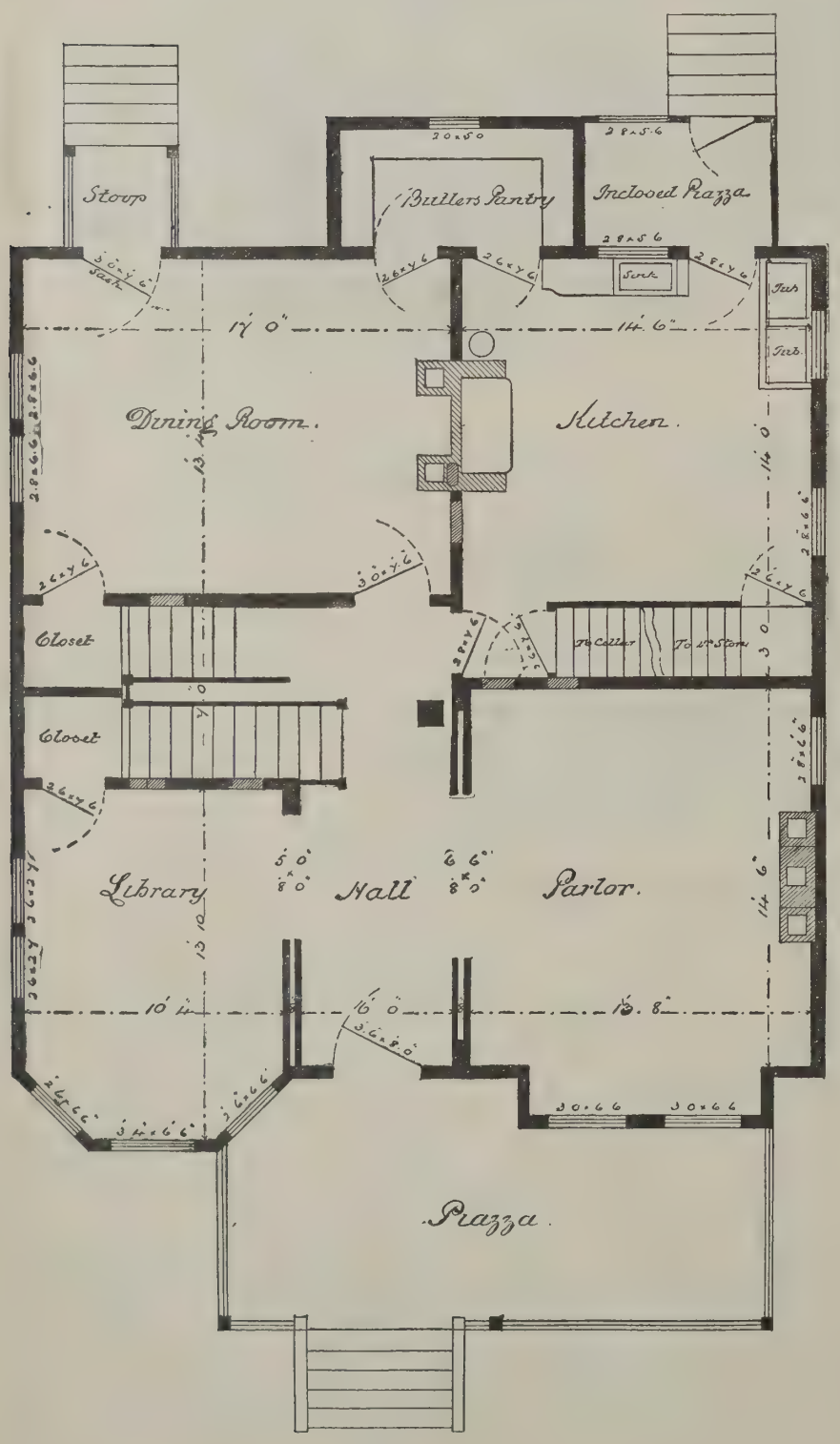
FIRST FLOOR PLAN.



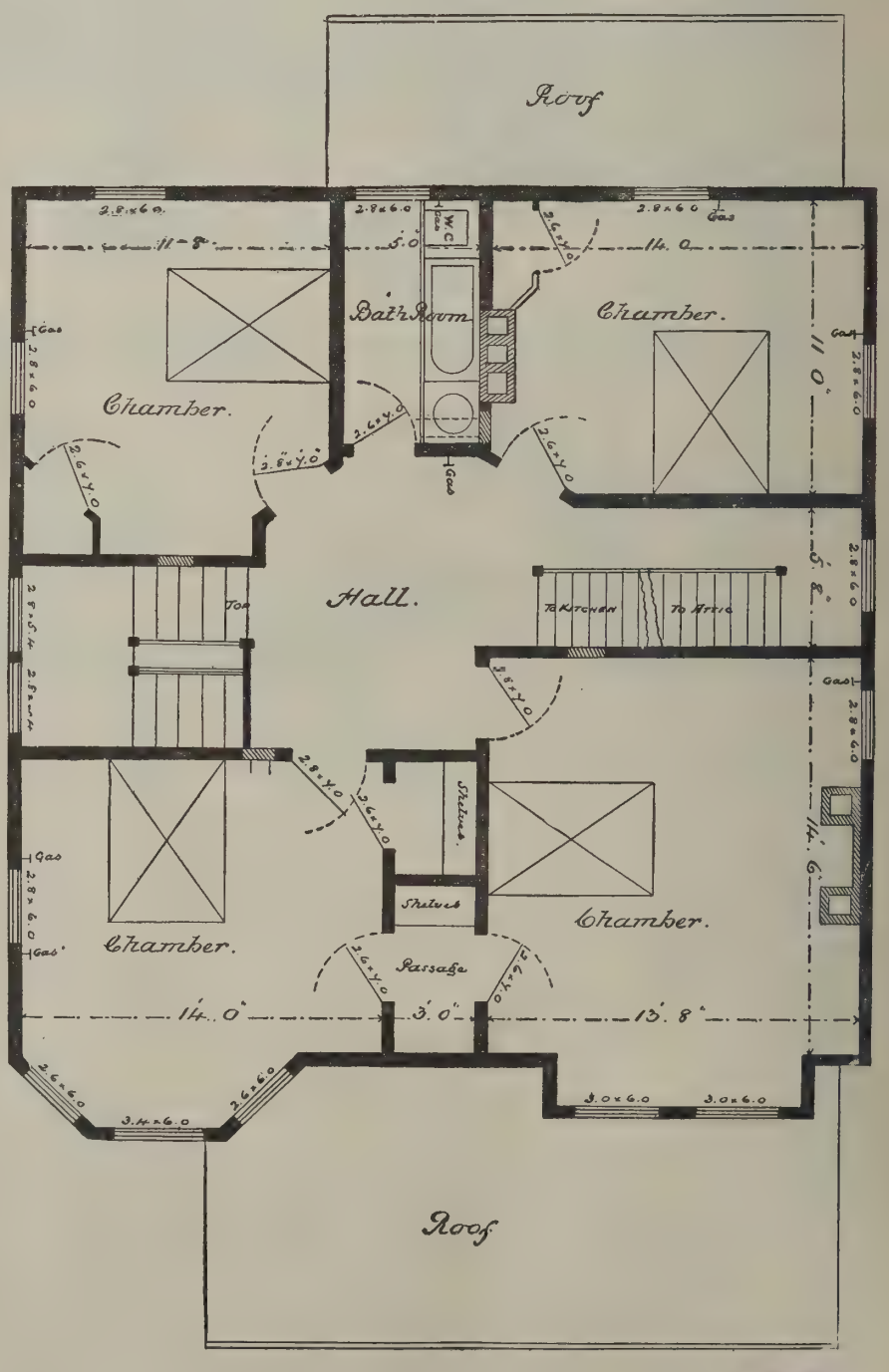
SECOND FLOOR PLAN.

SKETCH FOR A COTTAGE.

A TOWER of Victory has been erected on the grounds of Washington's Headquarters, at Newburg, N. Y., at a cost of $35,000. It affords beautiful views of the Hudson, the Highlands, and the surrounding country.



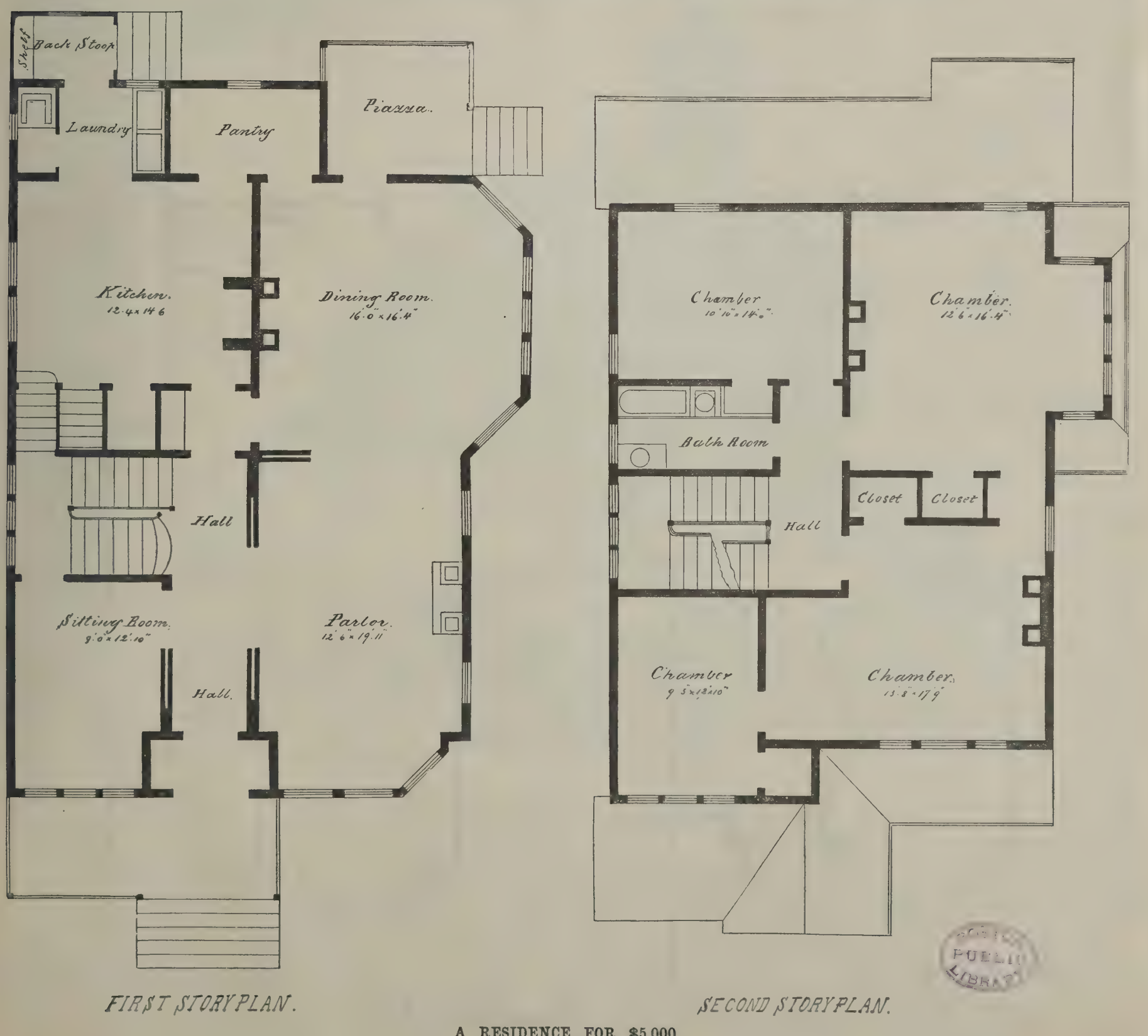
1st Story Plan



2nd Story Plan.

A COTTAGE FOR $4,200.

[For description see page 140.]



FIRST STORY PLAN. SECOND STORY PLAN.

A RESIDENCE FOR $5,000.

[For description see page 140.]

A $4,200 DWELLING.

We give a perspective view and plans of a neat dwelling, the general dimensions of which are as follows:

Front, 29 ft. 6 in., exclusive of bay window; side, 48 ft. 9 in., not including piazza.

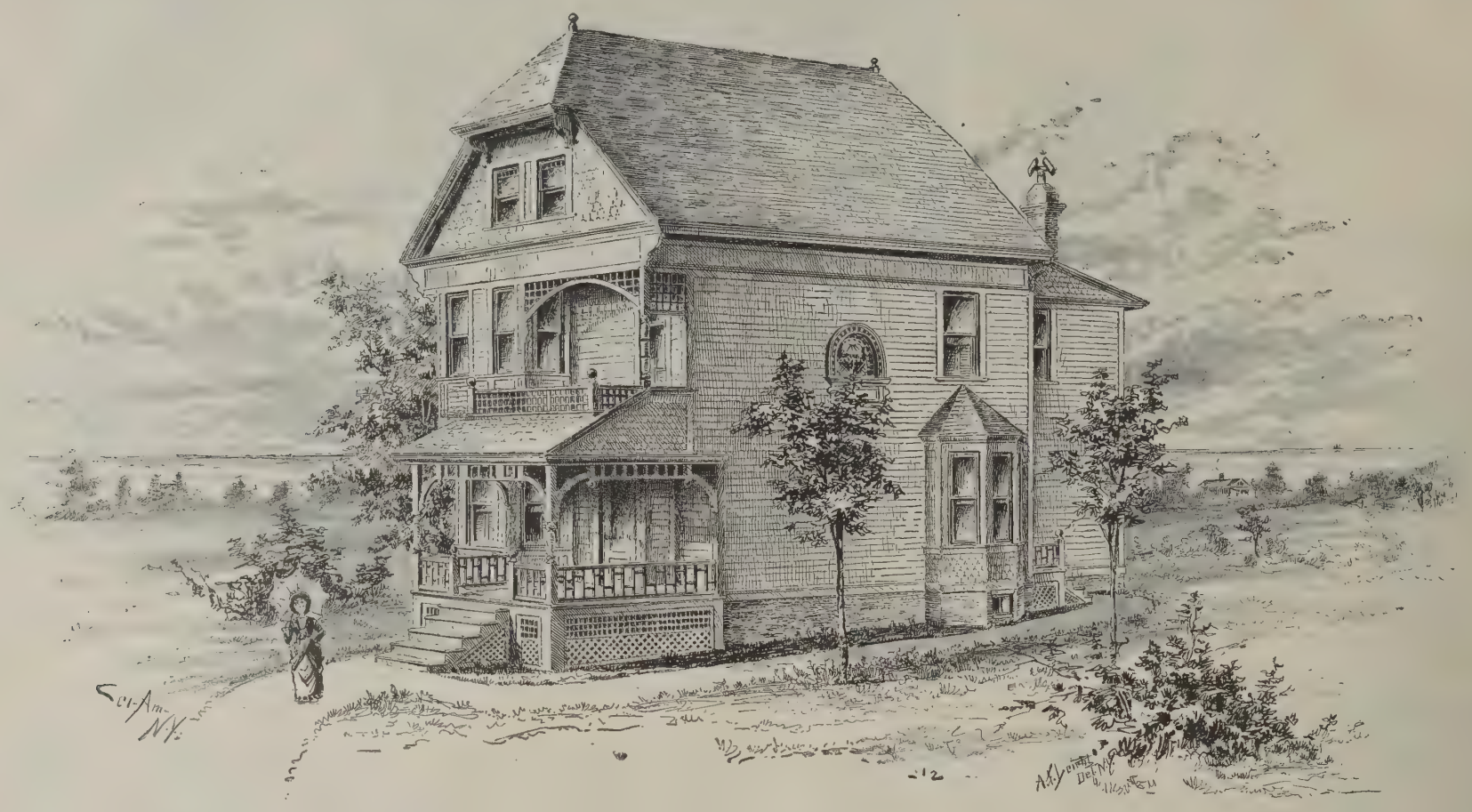
Cellar, 7 ft.; first story, 9 ft. 6 in.; second story, 9 ft.; attic, 8 ft. See floor plans for dimensions of rooms.

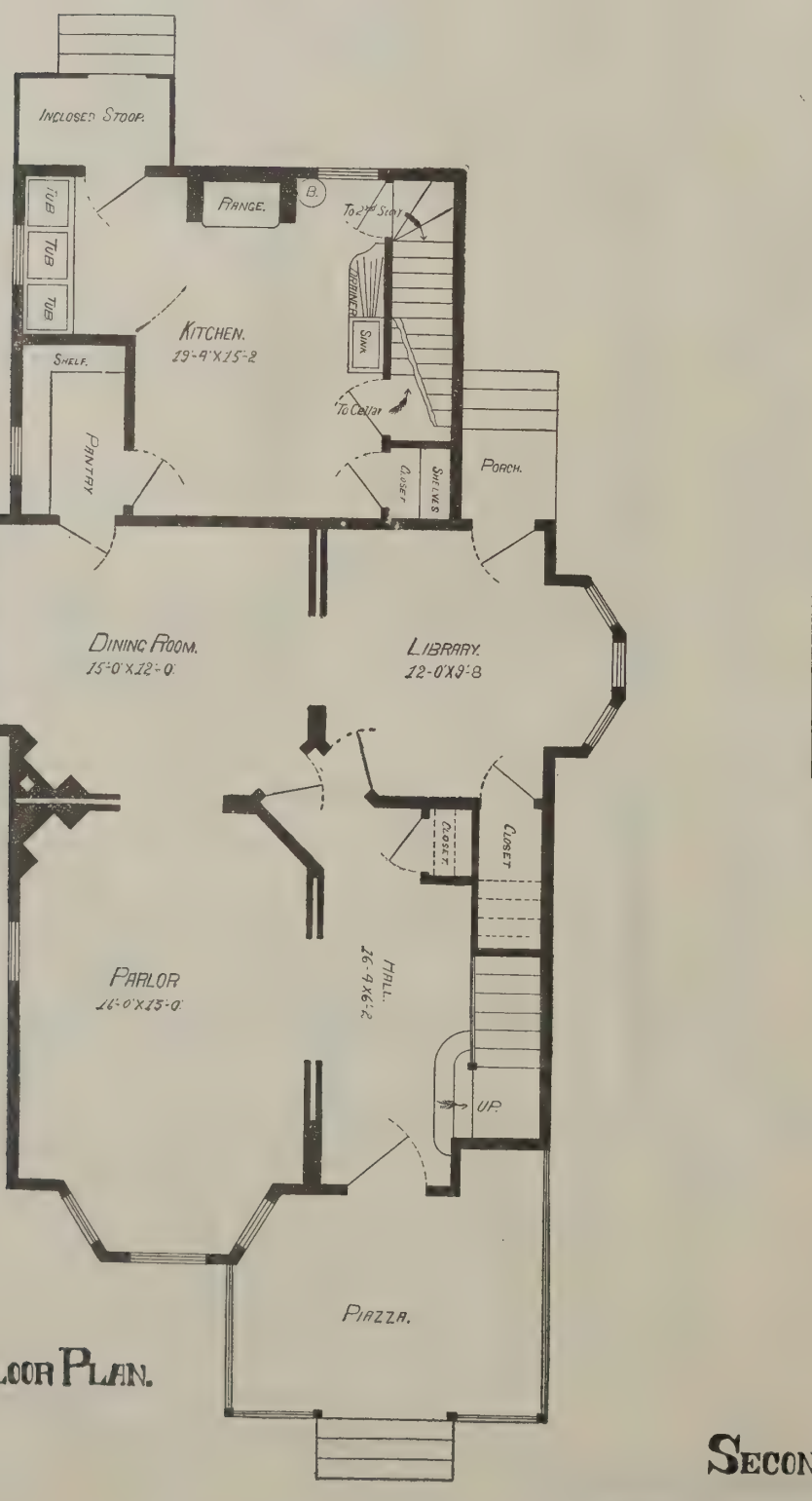
Materials. — Foundation, brick; first and second stories, clapboards; gables, cut shingles; roof, slate.

Cost.—Four thousand two hundred dollars, including furnace and mantels.

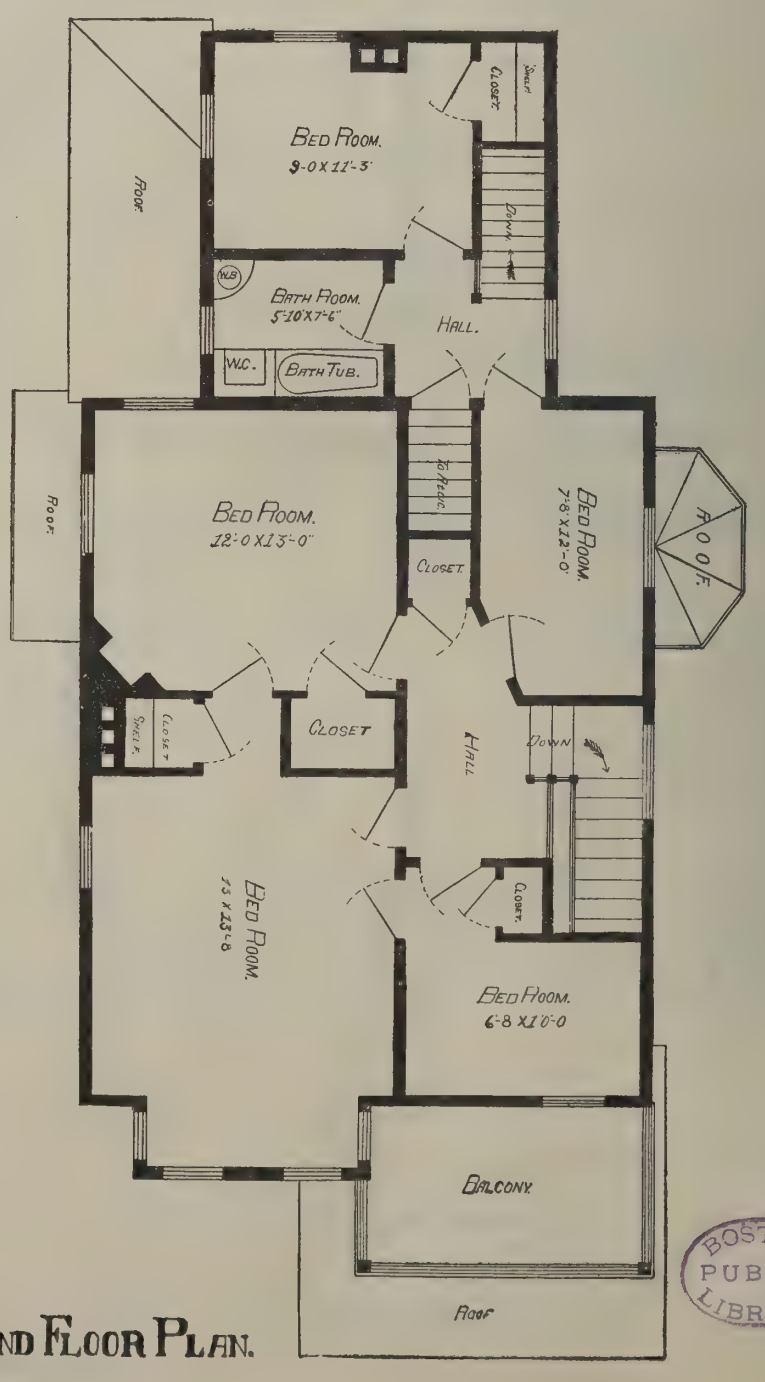
Fireplaces are provided in the dining room, parlor, and one bed room. The attic has two bed rooms, front room, and hall. Cellar under the whole house.

Prof. Thomas, of Little Rock, has a curious library. The covers of the books are of wood, each a different specimen. They are made from white oak, red oak, black oak, chestnut, American beech, birch, red cedar, yellow pine, pitch pine, willow, poplar, cypress, "old field" or long-leaved pine, bois d'arc, black walnut, hickory (several varieties), white and red maple, box elder, black locust, black sumac, water locust, coffee bean, wild plum, holly, basswood, papaw, bay, umbrella, wild cherry, sweet gum, elm (several varieties), sycamore, witch hazel, butternut, pecan, hickory, and twenty or more other woods.





First Floor Plan.

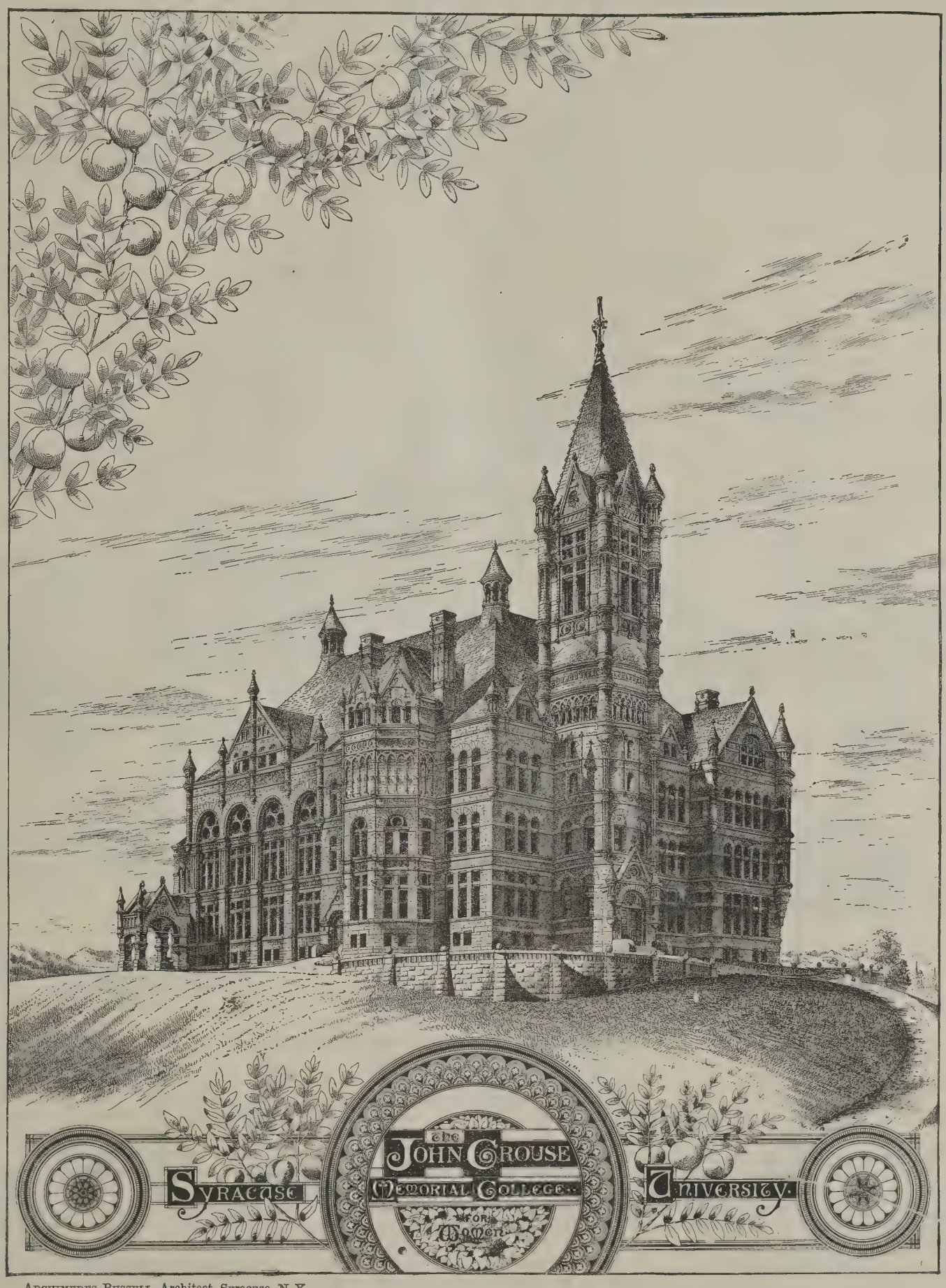


Second Floor Plan.

A $4,200 DWELLING.

THE JOHN CROUSE MEMORIAL COLLEGE FOR WOMEN.

We take pleasure in presenting to our readers an illustration of the John Crouse Memorial College for Women, which it is proposed to erect on the hill west of the Hall of Languages, Syracuse University, Syracuse, N. Y. This edifice is to be the gift of one of the wealthiest and most prominent citizens of Syracuse, Mr. John Crouse. The donor of this magnificent gift well deserves to be held in grateful remembrance by every friend and well wisher of the Syracuse University, as well as by the students and faculty. It is proposed to make this building a model one in every respect, and neither pains nor money are to be spared to render it the most perfectly equipped college to be found in the country. The structure is to be five stories in height, to be built of East Long Meadow brownstone, and to cover an area of nearly two hundred feet square.



ARCHIMEDES RUSSELL, Architect, Syracuse, N. Y.

In this connection a brief historical sketch of Syracuse University may interest our readers.

The college now known as Syracuse University had its origin in Lima, a pretty little village in Western New York, but quite out of the way, and not easy of access. It was then called Genesee College, and the first gathering of faculty and students occurred on Monday, June 9, 1851. The faculty consisted of Benjamin F. Tefft, D.D. LL D. and Professors Houghton, Douglass, Whitlock, and Alverson. On June 12 of same year, the Rev. B. F. Tefft was inaugurated president of Genesee College, and on July 10 the names of thirty-eight students were enrolled on the college register. November 5 saw the faculty increased by the addition of Professors Hoyt and Fowler. The college thus organized continued with varying fortunes until July 7, 1871, when it disbanded. In 1866 the subject of removing the college from Lima began to be agitated, and the idea of a central university for the Methodism of New York was first publicly announced in the *Northern Christian Advocate*, during the year 1873. From this time forth the new enterprise met with great favor on all sides, except with the citizens of Lima, who were reluctant to see the withdrawal from their midst of their principal attraction, to which we may well believe they had become greatly attached, and who procured an injunction against its removal. Prominent members of the Methodist Central Conference were nevertheless commissioned to carry forward the good work, and substantial aid was soon forthcoming. Syracuse, being the most central city in the State, was finally settled upon as the most appropriate home for the new college.

The site now known as University Hill was secured, plans made by the well known architect, H. N. White, were adopted, and July 19, 1871, the contract for buildings were contemplated at such time as the finances of the university should admit of their realization. The institution has struggled along, sometimes meeting with reverses, but now and then being fortified and strengthened by the reception of substantial encouragement from some of its many and devoted friends. Now at last the wheel of fortune has suddenly turned inits favor, and it finds itself at the flood tide of prosperity, with the prospect before it of a long and honorable course of usefulness and well deserved success. University Hill commands a magnificent view of the belt of hills which girdle the city, with Onondaga Lake set like a sparkling gem in the distance. Upon the west hill an observatory has just been erected, and near the Hall of Languages a suitable building is in process of erection, for the accommodation of the fine and valuable library which has been generously bestowed upon it by one of its friends. Syracusans are proud of the University, and they, in common with its hosts of warm friends throughout all parts of the country, rejoice in the evidence of its well merited prosperity.

The alumni of Syracuse University have members not only in almost every State in the Union, but count among their number graduates from Canada, England, Mexico, San Domingo, Brazil, China, India, and Japan —*Architectural Era.*

How a Marble Statue is Made.

Mr. John A. P. Macbride, sculptor, who was introduced to a large audience, chiefly of workingmen, by Sir James Picton, recently gave a practical lecture on the above subject, at the Rotunda lecture hall, Liverpool. After giving a sketch of the art and its great antiquity, the lecturer drew a profile in chalk on the blackboard, which he filled in with clay, and proceeded to demonstrate the building up and modeling of a portrait bust of soft clay. He stated that there was a general and erroneous opinion that in taking a portrait bust it was necessary to take a cast of the face. This was a mistake, for the head lost all the spirit and go by such a mechanical process that should distinguish an artist's work. The truth was not always that which appeared to be true, and the sculptor had to convey some idea of the character as well as of the mind of the sitter; and a man who knew his work ought to be able to do so with his fingers. Carving was a secondary consideration. The lecturer then explained the process of pointing a marble statue. In this process, the model and the block of marble were each fixed on a base called a scale stone, to which a standard vertical rod could be attached at corresponding centers, having at its upper end a sliding needle, so adapted by a movable joint as to be set at any angle and fastened by a screw when set. The sculptor having marked the governing points with a pencil on the model, the instrument was applied to these, and the measure taken. The standard being then transferred to the block base, the pointer, guided by this measure, cuts away the marble, taking care to leave it rather larger than the model, so that the general proportions were kept, and the more important work then left for the sculptor's hand.—*Building News.*

ABOUT 5,500 buildings have been rebuilt and improved in Charleston, S. C., in the year since the earthquake, and 270 new buildings have been erected. This has been a busy year with mechanics and builders at Charleston, and about $3,500,000 has been expended in this work.

A STABLE COSTING $5,500.

We present herewith front and rear perspectives, with plans, for a handsome stable now being erected in Brooklyn, N. Y., from designs and plans prepared at the Scientific American office. The general dimensions are: Front, 40 feet; side, 25 feet. Height of stories: First story, 11 feet; 5 feet breastwork in second story.

Materials.—Foundation, stone; water table, red granite; outside walls, red pressed brick; trimmings, buff brick; tower and gables, shingles; roof, black and red slate; inside wall finish, enameled brick; ceilings and stable work, Georgia pine; cellar under carriage room. Cost, $5,500.

Special Features.—Space for six carriages in carriage room; accommodation for four horses; ample ventilation and light; stable connected by sliding door. Both floors are laid with 2 inch Georgia pine plank.

A Great Building.

Mr. J. L. Smithmeyer, architect of the Congressional Library building, states in his first annual report that the Congressional Library building when completed will be the largest structure in Washington, with the exception of the Capitol. It will cover 111,000 square feet of space.

In a building of such magnitude and importance, every step in the progress of the work must be carefully considered, lest fatal mistakes, due to hasty construction, should occur. It was deemed of the utmost importance to test every foot of ground supporting the foundation walls. For this purpose a traveling testing machine was constructed, which will give an accurate test of the entire soil. The tests thus far made have been most satisfactory, the soil standing a maximum pressure of 13·5 tons to the square foot, only 2·5 tons being required. These tests will be continued until the foundations are laid.

The method of testing the soil and putting in the concrete foundations may be briefly described as follows: First, the trench excavations are made by the contractor to the width and depth required by the plans, the bottom of the trenches being made perfectly level. Then the testing machine, consisting of a car bearing the required amount of weight in pig lead for making the tests, is placed in the trenches upon iron rails, which rest upon four cast iron pedestals, the latter being set four feet apart each way, each pedestal covering one foot of ground. Thus, one-fourth of the entire weight borne by the car rests upon each one of the pedestals, and the precise weight sustained by each square foot of ground is exactly determined. The soil being thus tested as to its resisting strength, is then ready to receive the concrete foundations.

A COTTAGE FOR $4,200.

We give on page 136 a perspective view and floor plans of a cottage costing $4,200. The general dimensions are:

Front, 32 ft.; side, 39 ft. 2 in., exclusive of bay window and butler's pantry. The size of rooms will be seen by reference to the floor plans.

The height of stories is as follows: Cellar, 7 ft.; first story, 9 ft. 6 in.; second story, 9 ft.; attic, 8 ft.

Materials.—Foundation, stone; first and second stories, clapboarded; gables, cut shingles; roof, slate.

Cost.—Four thousand two hundred dollars, including furnace and mantels.

This house is designed to be heated by a furnace. There are fireplaces in the dining room and in one front bed room. The attic has two bed rooms and hall finished, and garret. Cellar under the whole house.

A RESIDENCE FOR $5,000.

The house illustrated on page 137 has the following general dimensions:

Front, 31 ft. 6 in., including bay window; side, 43 ft., including bay window.

Cellar, 7 ft.; first story, 10 ft.; second story, 9 ft. 6 in.; attic, 8 ft. The floor plans show the sizes of the rooms.

Materials.—Foundation, stone; first and second stories, clapboards; gables, cut shingles; roof, slate.

Cost.—Five thousand dollars, without heater and mantels.

It may be heated by a furnace. There are fireplaces in the dining room and in one chamber. The attic has two chambers and hall finished. Cellar under the whole house. Water closet off the laundry, and private stairs from kitchen to platform of main staircase.

Proportions of Rooms.

There are few objects connected with our art that have been more frequently dwelt on by those who have undertaken to be our guides and monitors than the right proportions to be given to rooms. Vitruvius led the way, and subsequent theorizers have laid down, sometimes very dogmatically, their views of just proportions. I find, however, in the actual practice of the ablest men such extreme diversity, and I observe pleasing effects producible by the adoption of such widely different proportions, that I find myself, I confess, much inclined to be somewhat incredulous of all these theories. Certainly if beauty could be thus reduced to a formula, and the proper relation indisputably established between the length, breadth, and height of every room, a royal road would be cleared for us, which would be at least very convenient both to those who teach and to those who learn. I fear I can scarcely hope to furnish you with such a desirable help in your studies. I find rooms of universally admitted beauty, yet of almost every geometrical figure. I have heard of the room in the museum of Florence, the Tribune it is called, which contains the Venus di Medici, spoken of in terms of rapturous approval for the beauty of its form and proportions. This saloon is an equilateral octagon on plan. I have known square rooms greatly admired—such, for example, as the saloon in Cobham Hall, which is usually pointed to as one of the *chefs-d'œuvre* of Inigo Jones. Who is there that is not charmed with the proportions of the Pantheon at Rome? This, you know, is circular. The classical teacher of our art, Vitruvius, seems to contemplate only rectangular forms, and directs us to adapt the double cube and the cube and a half, whether for a temple or a triclinium.

The Sistine Chapel, attached to the Papal Palace, upon which the best art of Italy in its best days was expended, is a triple cube, viz., 133 by 44. While of modern French, Italian, and English teachers, each seems to have his own special favorite proportion. The truth I believe to be that, so bounteously have we been endowed, and so liberally have the laws of beauty in form and proportion been framed, there exists in fact an endless variety of beautiful forms and proportions. My impression is that it is as little consistent with truth to lay down any one definite form or proportion as the best as it is to extol any one particular curve as the line of beauty. I believe that there are as many pleasing proportions to be given to rooms as there are pleasing harmonies of color and sound. The purpose of a room must always be an important guide in determining the form and proportions to be given to it. If planned so long in proportion to its width as to remind us of a passage, it loses its distinctive character, and creates a false impression, which it can never be good art to do. It is indeed obvious that a consideration of the special fitness of a room for its destined uses must always greatly influence its proportions. The octagon form, so much affected by our ancestors in planning their chapter houses, owes its origin probably far more to the propriety of that form for a chamber intended for the convenient assemblage of the members of the chapter sitting in council than to any intrinsic architectural beauty, however unquestionable that beauty may be.—*S. Smirke.*

A STABLE COSTING $5,500—FRONT VIEW.

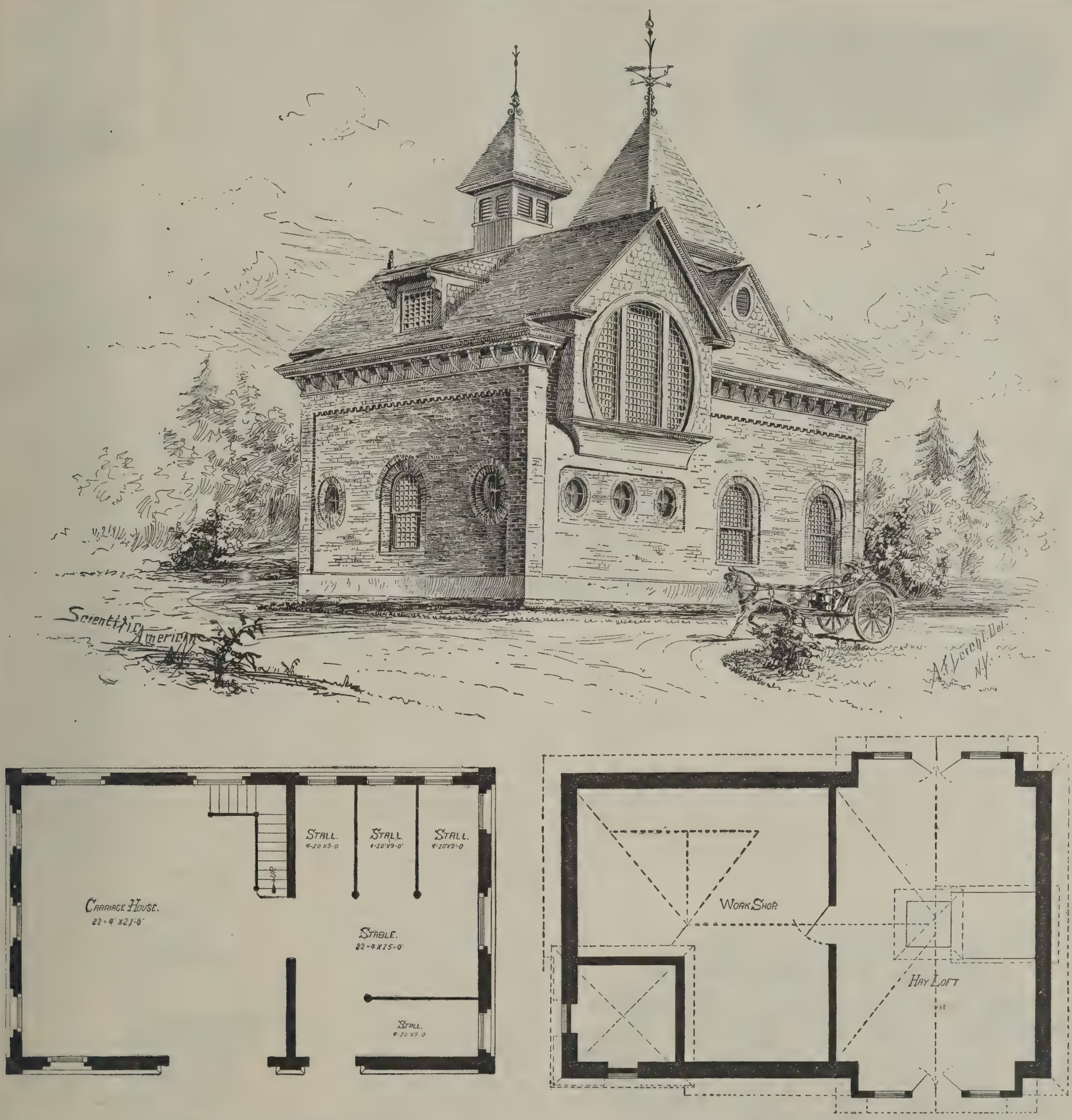
The *Firemen's Herald* says fire protection, like charity, should begin at home. However efficient may be the public service against fire, a single bucket of water properly administered may stop a fire that all the efforts of the brigade would be unable to quench, and besides, the jet of a powerful engine is as destructive in its way as fire to all perishable articles within a room, such as furniture, pictures, and bric-a-brac.

Plants for Room Decoration.

The universal custom now prevailing in most establishments of having a few plants in addition to cut flowers dotted about the different rooms induces me to write a short paper thereon, not only because it has developed into a very important part of the gardener's work, but it likewise requires a fair share of taste in the arrangements, as well as suitable plants for the purpose. Generally speaking, each room being differently furnished will require a different class of plants for its adornment, but, as a rule, plants with stiff, upright growth are objectionable to the eye, as they do not hide the pot or stems unless others of a dwarfer growth are associated with them; therefore they should only be used when possessing special features either in flower or foliage. Too many plants in a room are objectionable, because they detract from rather than elevate or enhance the effect, especially if the room is elaborately furnished. For instance, plants assigned to the front hall or corridor would be unsuitable in a drawing room or boudoir.

Another important matter to study is the various kinds of receptacles provided for the use of plants. These vary in size and shape greatly, but are generally of a fanciful, elaborate, and artistic design, and the plants for these should be selected with the greatest care and taste, so as to add a completeness and finish, and in no way hide or diminish the effect of their appearance. I have often found, however, a great difficulty in getting plants to go in them without taking them out of the pots, and in many cases I have found it necessary to reduce the ball of roots in order to fit the latter in properly. This quite ruins the plant, for, in the case of choice or delicate growing subjects, it is almost impossible for them to recover. But in order to meet this difficulty, it is advisable to make a selection of plants, grow them in suitable sized pots, and use them for no other purpose. To do this it requires a sufficient number for three changes; say, if twenty plants are required at one time, sixty should be grown, and duplicates of all to be grown to follow on.

The atmosphere of rooms is generally dry, though warm, and impregnated with gas and other enemies to plant life. So different is all this to the healthy atmosphere of a plant house, that it is necessary that every plant used should have completed its growth, or some injury will follow. Take the different varieties of adiantums, for instance. If used for the decoration of rooms in a growing state, the young fronds would most certainly be injured; yet, when properly prepared, there are no more popular or suitable plants for the purpose, and they can be grown to a useful size in small pots. Nephrolepis exaltata, though not so choice as others, is a most handsome fern to use. Its long and gracefully drooping fronds are an ornament in any position, while many of the Pteris family have a fine and graceful appearance, and may be used freely. Nice plants of Spiræa japonica with or without flowers are very ornamental. The different sorts of lycopods make perfect plants for small vases, as also do the artillery plant (Pilea muscosa) and the little Caladium argyrites. In fact, there is no lack of either foliage or flowering plants suitable for a tasteful arrangement either in a drawing room or boudoir, while for more commodious places, such as the entrance hall, corridor, or staircase, and where larger plants are admissible, there is the beautiful Caladium esculentum, with noble foliage and which stands well, several sorts of palms, the larger fronded ferns, curculigo, Ficus elastica, Hibbertia volubilis, and the calla or Ethiopian lily, all of which have a reputation for retaining their beauty better than many others, and therefore should be grown for the purpose. But to avoid as little injury as possible, frequent changes are necessary, and it is a very good rule to water every plant well before it is used, and when it again needs water change it for another. Let all pots and plants be kept very clean, and avoid letting the plants remain long enough to make growth in the different positions, for such growth, when brought out to the light, is generally very weak.—*Thomas Record, The Garden.*

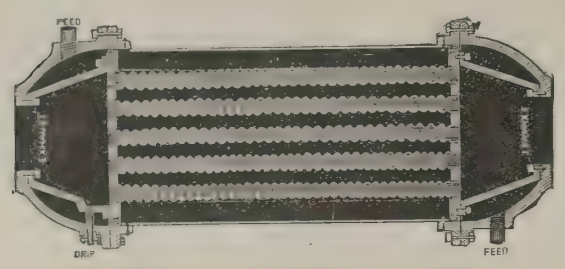


FIRST FLOOR PLAN. SECOND FLOOR PLAN.

A STABLE COSTING $5,500—REAR VIEW.

THE WAINWRIGHT HORIZONTAL FEED-WATER HEATER.

We illustrate herewith the Wainwright Horizontal Feed-Water Heater, adapted for use in a horizontal position under the floor of an engine room, or where the head room is limited. The feed water enters at the lower opening marked "feed," fills the body of the heater, and having been heated by the exhaust steam surrounding the tubes, passes to the boiler at upper opening marked "feed," the exhaust entering at either end. A drip pipe, as shown, is provided for escape of the water of



HORIZONTAL FEED-WATER HEATER.

condensation, and a hand hole for washing and cleaning. It will be seen that this heater contains a large body of water well disposed to receive heat, the tubes, being of corrugated copper, present 50 per cent. increased heating surface over plain tubes of the same length, while at the same time five times the strength is added, and owing to their property of expansion and contraction, all danger of the ends pulling out or the joints working and leaking is eliminated. This property of expansion and contraction also prevents any accumulation of scale and sediment.

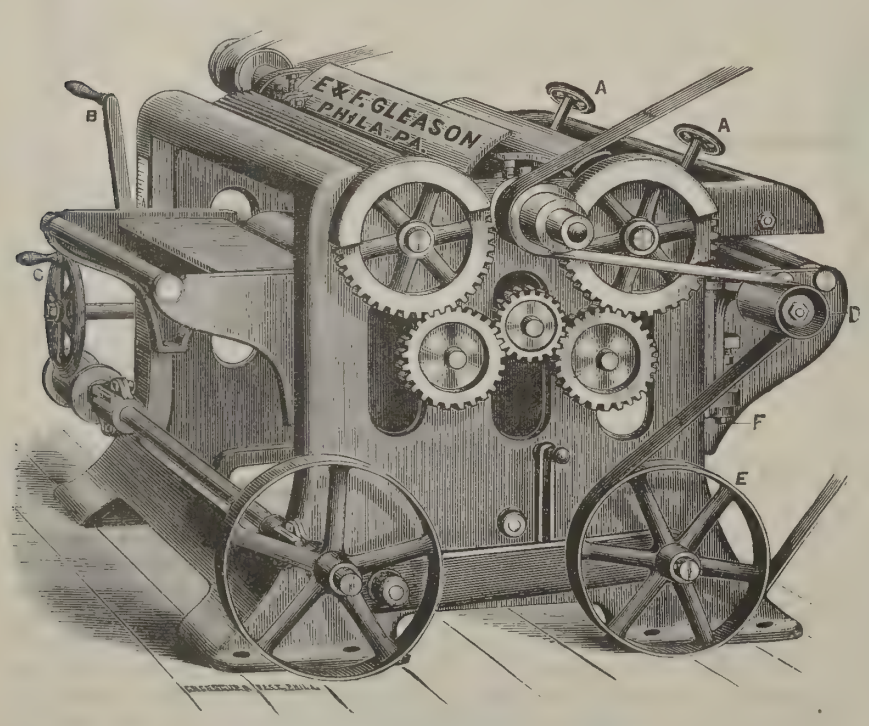
These heaters are manufactured by The Wainwright Mfg. Co., 65 Oliver St., Boston.

The Charter Gas and Gasoline Engine.

This gas engine, manufactured by the Williams & Orton Manufacturing Company, of Sterling, Illinois, possesses various features that must commend it to the attention of all interested in the production of power from gas. It is characterized by great simplicity, having no gearing, so that it is practically noiseless. It has a power and a supply cylinder, one placed over the other, and each working or worked by its own crank. An impulse is given at every revolution of the wheel, and by the governing device the amount of gas consumed is regulated in proportion to the work done. The ignition valve is easily accessible, and needs no adjustment on starting the engine. It can be used either for gas or gasoline. For the latter, a few drops are aspirated at each stroke into the cylinder, where mingling with the air they form the mixture for ignition. The gasoline can be kept in a tank outside the building, and is subjected to no contact with the flame until it has been thoroughly vaporized and has entered the working cylinder.

AN IMPROVED DOUBLE SURFACE PLANER.

A four-roll machine that is simple and durable, and all geared with the most improved extension gearing, is shown in the accompanying illustration, as made by Messrs. E. & F. Gleason, manufacturers of improved wood tools, American Street and Susquehanna Avenue, Philadelphia, Pa. Both heads are driven with one counter, and only two belts are required, the adjustment of bed and control of feed being both on left-hand side of machine, at B C, within immediate reach of the operator. The bottom head is quite as easy of adjustment as the top head, having large screws, F, one at each box, to regulate cut or chip and keep it in line with bed and top head, both heads having self-oiling boxes. The machine will double-surface stuff from one-eighth inch to six inches in thickness. It occupies a floor space of about four feet by forty inches. The counter shaft has patent self-oiling hangers and patent self-oiling loose pulleys.



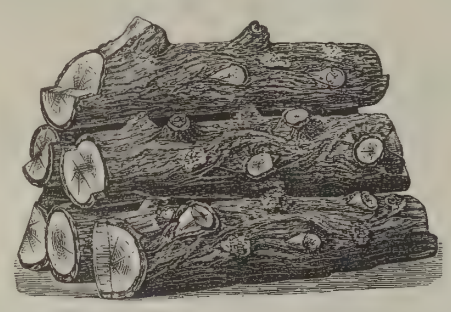
GLEASON'S DOUBLE SURFACE PLANER.

Foundations in Wet Ground.

A new method of making foundations in wet ground has been devised by M. Bonnetond, a French military engineer. His plan is to bore a hole 10 ft. or 12 ft. deep and 1½ ft. in diameter in the damp ground, and in this a series of dynamite cartridges are placed, and finally exploded. The expansion of the gases generated drives the water far out beyond the sides of the hole, into which it does not return for at least half an hour. The time thus gained is utilized in rapidly excavating the cavity, which is then filled with a cement concrete, which sets before the return of the water. The method has been adopted in the construction of a fortified enceinte at Lyons, and is said to have led to very rapid work.

HOW TO MAKE A CHEERFUL FIRESIDE.

In the accompanying illustration is shown one of several forms of arranging artificial sticks or logs in a fireplace for burning gas, to give a close imitation of a blazing wood fire, which has been patented and is made by Henry P. Dixon & Co., of 1330 Chestnut Street, Philadelphia. Several other forms of logs and grouping are also made, the sticks and the logs being colored to resemble wood, and having fixed between them splints of asbestos, which become incandescent when in use, so that when the gas is turned on and a match applied to the small jets arranged to the best advantage over and between the logs, it gives the appearance of a first class wood fire. These artificial logs are made of material not injured by the flames, and are designed to last a life-time without cracking or breaking, the gas



ARTIFICIAL LOGS FOR FIREPLACES.

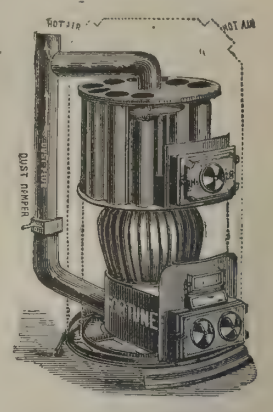
being supplied through a brass union fixed in the back of each log, through which connection can be readily made by rubber tubing or otherwise to the nearest gas pipe. A good, cheerful fire, which makes neither dust, dirt, nor ashes, is thus ever ready at hand and available by simply turning on and lighting the gas, the flow of which is regulated as desired.

The Sounding Board in St. Paul's Cathedral.

The form of the sounding board is, I think, a novelty, but I am led to believe that it is an approach to the true form for the purpose. Flat sounding boards have been most commonly tried, but they are now generally discarded. A parabolic sounding board behind the preacher has been used with a certain effect, but the advantage is limited to those in the direction of the axis of the curve; and in these cases, action and reaction being equal, the preacher can sometimes hear the criticisms of his audience, if any should be uttered tolerably loud in the proper direction. Besides which, a shell of this description would have had little effect in stopping the objectionable echoes. To meet these difficulties, a curve was selected which has the property of distributing uniformly in every direction so much of the preacher's voice as can be advantageously reflected. The figure is hyperbolic, the axis being perpendicular over the preacher. The diameter is ten feet, and so much of the voice it receives is reflected as if it came from a point about four feet from the preacher. It would be interesting to know, but I am not aware that sufficient experiments have been made to ascertain, what amount of sound is reflected from a given material. The harder the material, obviously the better the result. In this case hard organ pipe metal has been used. I observed a marked increase of audibility of the voice at a place where the assistance of the reflected sound is obtained over a point equidistant from the pulpit, but too high to receive the reflected wave from the sounding board.—*F. C. Penrose.*

THE POPULAR "FORTUNE" HOT AIR FURNACE.

A hot air furnace that is designed to include all the good elements of the best styles of modern construction, and is especially adapted for suburban houses, is shown in the accompanying illustration. It is manufactured by Messrs. Thomas, Roberts, Stevenson & Co., of Philadelphia, in four sizes, and has clinker-cleaning, shaking, and dumping grate, upright lever for shaking the grate, improved dust flue and check draft, improved cylinder, with and without drum heads, and extra large radiating surface, being durable and cheap, while economical in use. These furnaces are made at a moderate price, without any expense being put on for mere show, and thousands of them are in use in nearly all parts of the country.



THE FORTUNE HEATER.

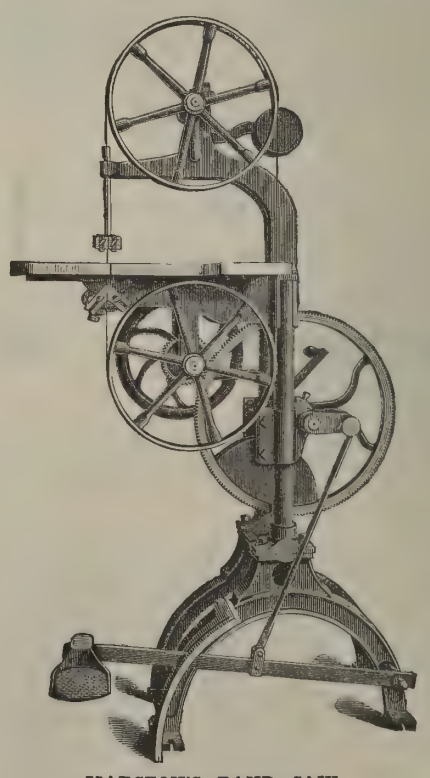
Not Defective Plumbing.

It many times so happens that plumbing is found a ready excuse for filthy people to place the blame upon "defective plumbing," while in reality it is other defects that are the real cause. There are many things to take into consideration besides faulty plumbing. You should ask yourself: Is your cellar pure? How many germs of disease are lurking there because you have failed to properly drain and ventilate it, and remove the decayed vegetation and other impurities? And the well or spring; how much filth, unseen or unrealized though it be, is permitted to enter there, until at last it enters your life blood and becomes a part of your being, bringing you to an untimely grave?—*Plumbers' Trade Journal.*

AN IMPROVED HAND AND FOOT POWER BAND SAW.

A strong and well made band saw machine, to be run by foot or hand power, is shown in the accompanying illustration, and is manufactured by Messrs. J. M. Marston & Co., of No. 3 Appleton Street, Boston, Mass. The table is 18×21 inches and 42 inches high, and is adjustable for cutting on a bevel. There is an adjustable guide for the saw above and below the table, the saw pulleys are 16 inches in diameter, and the driving power is by means of gears, all shafts being of steel. The upper saw pulley has an adjustment to tighten the saw and bring it in line with the lower saw pulley. The power machines are from the same pattern, and are arranged with driving shaft and pulley on lower part of the frame, and tight and loose pulley on lower saw shaft, so that it can be belted direct from main shafting without counter shaft. The machine is a very easy-working one, cutting some four times as fast as a gig saw with less power.

The circular saw machine made by the same firm has its center part of iron, with grooves planed for gauges to slide in, which allows very fine and exact work to be done on the machine. There is a collar on the arbor,

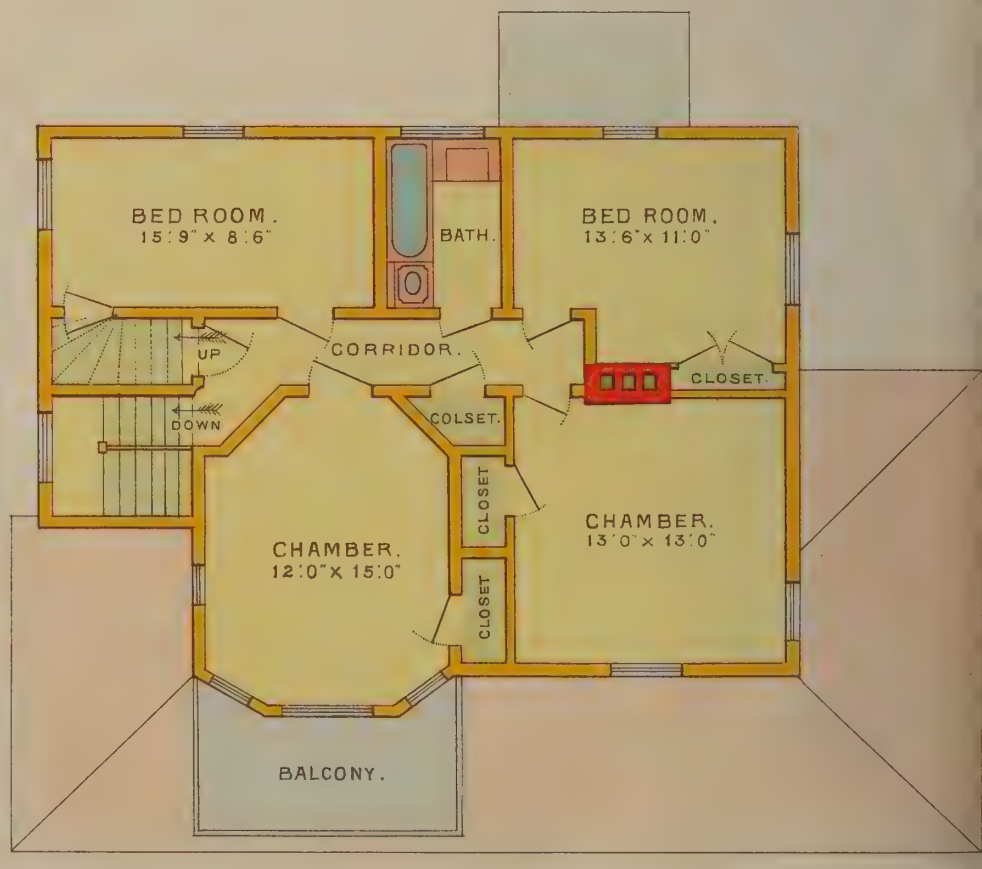


MARSTON'S BAND SAW.

so that any endwise wear can be taken up, and the gears are accurately cut from solid iron. The aim of the manufacturers has been to make a simple, strong, accurate, and durable machine, such as can be put to hard work without injury, some of their saws having been in use for fifteen years without needing repairs.

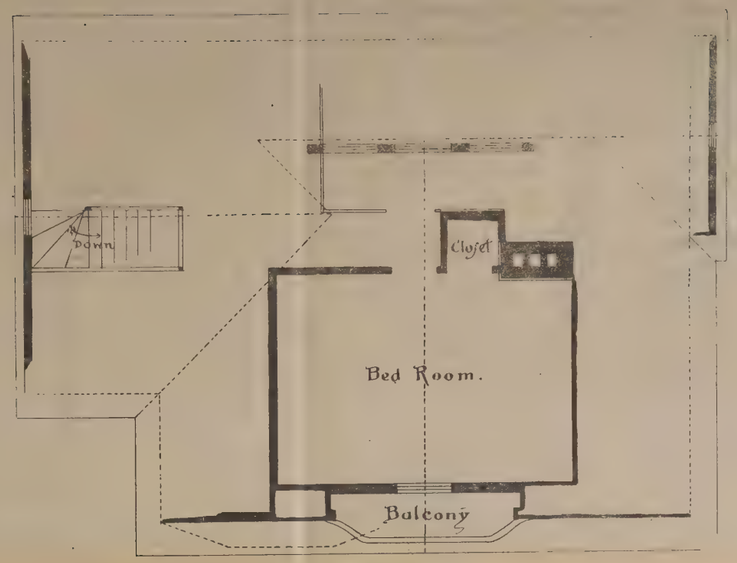
A DWELLING OF MODERATE COST

Plan of First Floor.



Plan of Second Floor.

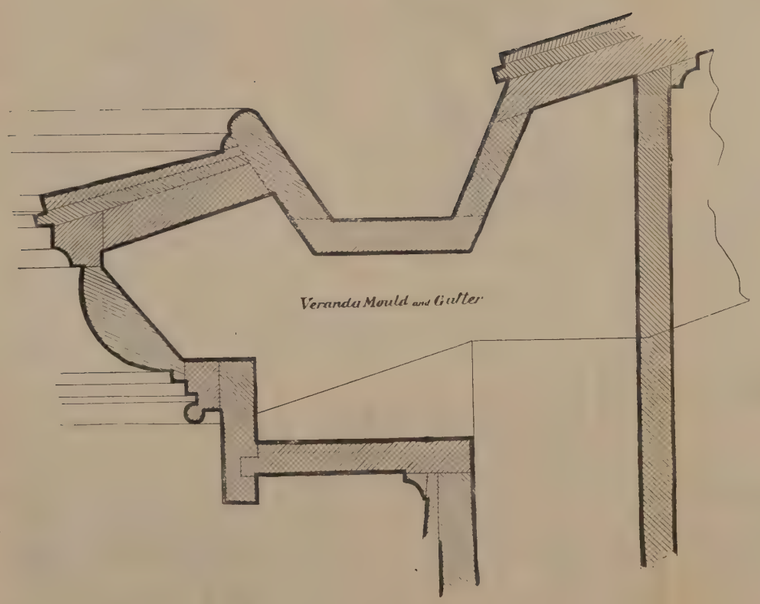
FRONT ELEVATION.

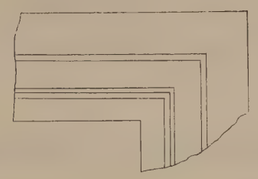


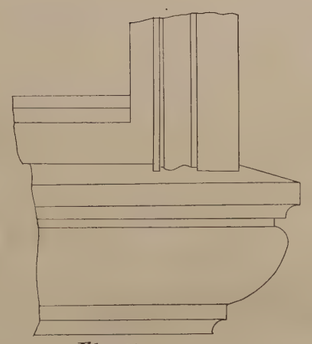
Attic Plan.

Side Elevation.

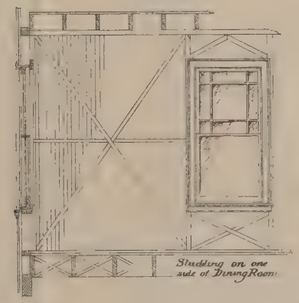
A Dwelling of Moderate Cost.

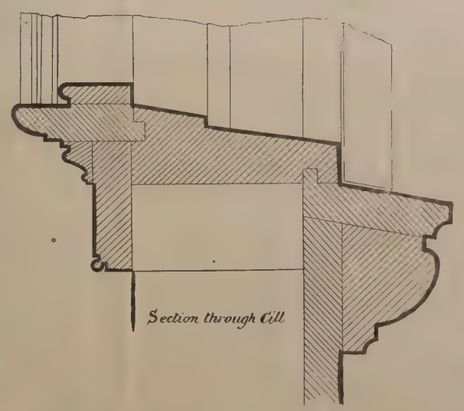




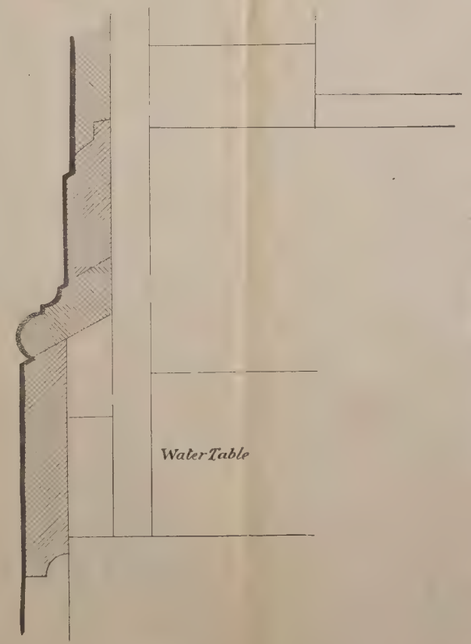


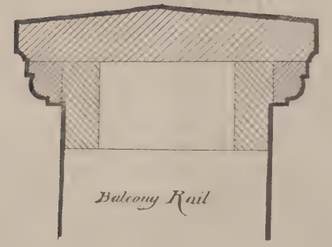
Elevation



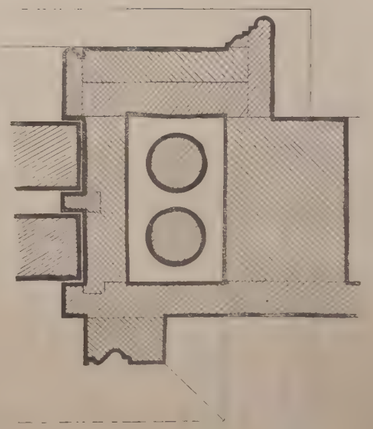


Section through Sill





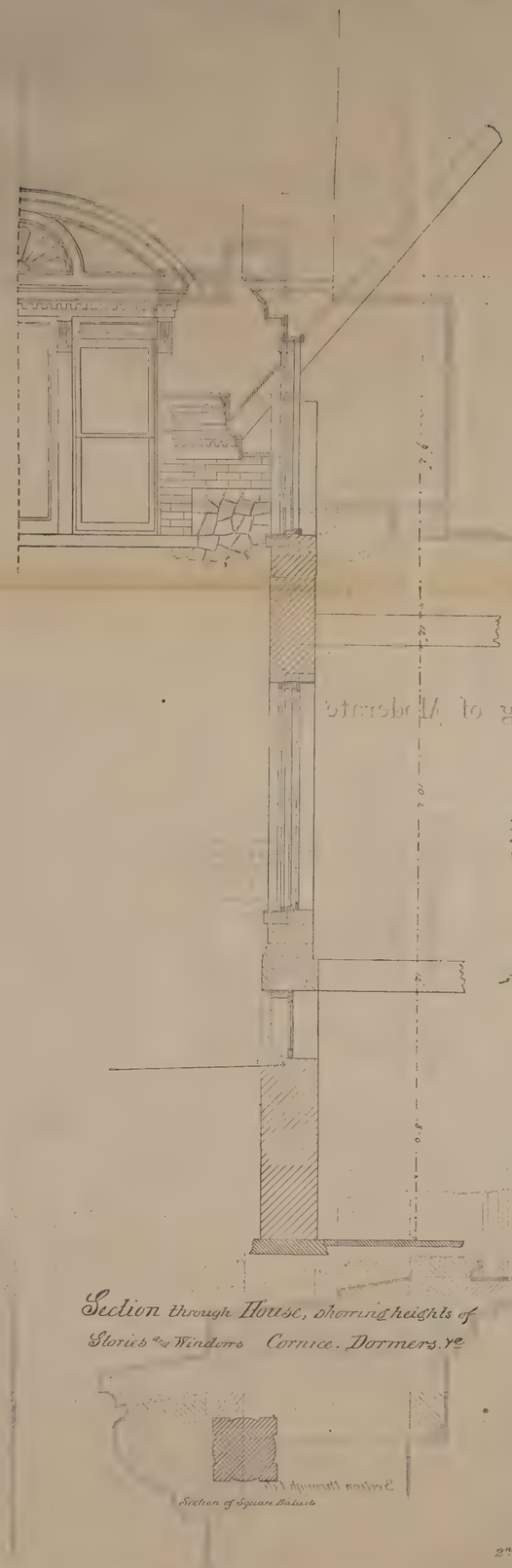
Balcony Rail



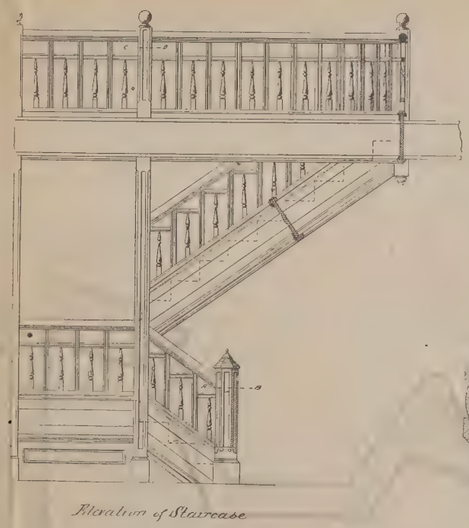
Details to accompany Colored Plates. For description see Architects and Builders Edition of Scientific American for December, 1887

A Suburban Residence.


WEST SIDE

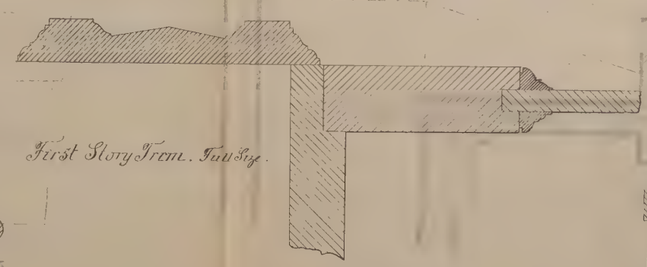

Section thro Porch and Balcony

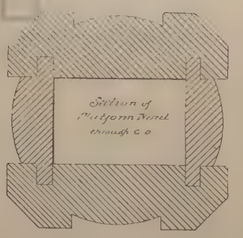

NORTH SIDE


Elevation of Staircase

Section of Main Newel through A B

Section through House, showing heights of Stories and Windows Cornice. Dormers. &c


First Story Trim. Full Size


Section of Mid-joint Newel through C D

Section of Rail

Details to accompany Colored Plates. For description see Architects and Builders Edition of Scientific American for December, 1887.

A SUBURBAN RESIDENCE

Plan of First Floor.

Plan of Second Floor.

SCHUMACHER & ETTLINGER, NEW YORK.